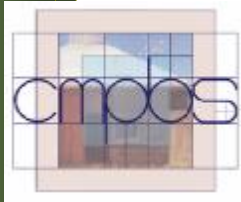




Version 2.0 *Pilot*

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GREEN GUIDE 
for Health Care™

***A best practices guide for healthy and sustainable
building design, construction and operations***

Version 2.0 *Pilot*
November 2004

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Release for Public Use

The *Green Guide for Health Care* is released for public use in PDF format. All replication in whole or in part must reference the GGHC and include the limitations on its use described herein. The *Guide* is an open source document that is provided at no charge for use by the health care design, construction, and facilities management communities. Material contained within the *Guide* may not be used by or as part of a for-profit enterprise (for sale or as a component of an educational program) in which attendees are charged fees without the express permission of the Green Guide for Health Care Steering Committee.

Version 2.0b is a maintenance release published in April 2005 primarily to correct minor copy and editorial issues.

"The Green Guide for Health Care is a superb resource. It helps the leaders and managers of health care institutions "walk the talk," promoting the health of patients, visitors, employees, community members, and the global community, while operating economically and efficiently. I hope that every medical center, hospital, and clinic in the nation gets a copy of the Green Guide, takes its lessons to heart, and joins the growing movement toward better healthier environments in the health care sector."

Howard Frumkin, M.D., Dr.P.H., FACP, FACOEM
 Professor and Chair
 Department of Environmental and Occupational Health
 Rollins School of Public Health of Emory University
 Professor of Medicine, Emory Medical School
 November 2004

Objectives

Welcome to **Green Guide for Health Care™**, the health care sector's first quantifiable sustainable design toolkit integrating enhanced environmental and health principles and practices into the planning, design, construction, operations and maintenance of their facilities. This Guide provides the health care sector with a voluntary, self-certifying metric toolkit of best practices that designers, owners, and operators can use to guide and evaluate their progress towards high performance healing environments.

Health care facilities present both a challenge and opportunity in the development and implementation of sustainable design, construction and operations practices. Issues such as 24/7 operations, energy and water use intensity, chemical use, infection control requirements and formidable regulatory requirements can pose significant obstacles to the implementation of currently accepted sustainability protocols. Furthermore, it is appropriate that guidelines customized for the health care sector reflect the collective fundamental mission to protect and enhance individual and community health, and that those guidelines acknowledge the intrinsic relationship between the built environment and ecological health. As health care institutions evolve a design language for high performance healing environments, they have the opportunity to highlight the associated health-based benefits. This in turn can inspire the broader adoption of health-based design principles in other building sectors.

This document is neither intended to establish regulatory requirements, nor to be viewed as a minimum standard for design, construction or operations. Rather it is designed to serve as a voluntary educational guide for early adopters of sustainable design, construction, and operations practices, to encourage continuous improvement in the health care sector, and to provide market signals to catalyze a richer palette of strategies for those who follow the early adopters. As the general level of green building practice rises, it is anticipated that the *Guide* will be updated to encourage continued leadership and higher levels of rigor associated with creating high performance healing environments.

Updates and Information

This document is available for download at www.gghc.org.

This is an evolving document that will be updated as new information and guidance is gleaned from the Pilot program. If you did not download this document from the GGHC website, **it is important that you register** at www.gghc.org to ensure that you will be notified of updates as this document progresses.

Please contact admin@gghc.org for further information about document use and opportunities to support it.

Using this Guide

Applicable Building Types

While an array of building types are represented in the health care sector, the *Green Guide for Health Care* is specifically customized for buildings that are predominately institutional occupancies as defined by the local building code, such as acute care hospitals, where regulatory requirements have created particular needs. Medical office buildings, clinics and other buildings where health care concerns are dominant can also use the *Guide*. Recognizing the full-range of construction, operations and maintenance activities associated with the health care sector, the *Guide* applies to new freestanding facilities, additions to existing facilities coupled with renovation, extensive rehabilitation/adaptive reuse projects, and existing facilities for which the *Operations* section can be used as a stand-alone best practices guide.

Credit Structure

The *Green Guide for Health Care* borrows the credit numbering scheme and credit outline structure of the U.S. Green Building Council (USGBC) LEED® family of products, by agreement, with some modifications. Each credit has the following elements:

- **Intent** – summarizes the goal of the credit.
- **Health Issues** – (new to the *Guide*) identifies specific health concerns addressed by the credit. Reviewed by Dr. Ted Schettler, M.D., MPH.
- **Credit Goals** – itemizes the specific steps to achieve the credit including threshold goals.
- **Documentation** – suggests documentation to monitor and baseline performance and benchmark achievement of the requirements. These represent the type of requirements that could be used in a LEED® style certification system. The *Guide*, however, is a voluntary self-certifying document. The GGHC Steering Committee has no intention of establishing a third party certification system. Hence it is at the user's discretion that appropriate record keeping and tracking systems are developed to internally monitor achievement of *Green Guide* goals.

Note that while the suggested documentation requirements in *Green Guide for Health Care: Construction* can be completed by the end of construction, some of the strategies in the *Operations* section require collection of up to a year's data to determine credit achievement. Furthermore, while these operational data requirements are especially geared for existing facilities, they are also intended to serve as useful references for new construction projects as they establish operations policies and ongoing operational protocols.

- **Reference Standards** – references the standards and documents that form the basis of the credit requirements.
- **Potential Technologies & Strategies** – suggests optional pathways for meeting the credit intent. Regional considerations and project specific performance needs, goals and other constraints are important factors to consider. Products and materials referenced in the Potential Technologies & Strategies section do not represent an endorsement but rather a suggestion for consideration in some applications.
- **References** – cites selected references providing further information on the credit, requirements, and suggested technologies and strategies.

Points & Achievement Levels

The *Green Guide for Health Care 2.0 Pilot* does not currently provide achievement level threshold rankings. The 2.0 Pilot will be used to determine appropriate achievement thresholds based on review of a representative sampling of pilot projects. Thus, during the early pilot phase, achievement will be indicated by number of points tallied along with fulfillment of all prerequisites (e.g., Project X attained 65 GGHC Construction points and 38 Operations points).

Existing facilities are encouraged to track their ongoing performance using the *Operations* section, while making a commitment to utilize the *Construction* section on future projects.

Construction projects cannot actually attain some of the points in the *Operations* section as some of them require a year's worth of data to achieve credit goals. These projects are encouraged to identify the Operations-related credits that they intend to achieve and establish commitments to these O&M goals through policy setting.

Integrating Operations

Operations and maintenance protocols are critical to maintaining the health and environmental profile of health care facilities once built, and should be considered during programming and design phases. In acknowledging this relationship, the *Green Guide for Health Care* addresses some of the key operations issues in the accompanying *Operations* section. Given the critical relationship between operations, building program and design, design teams are strongly encouraged to collaborate with facility staff early in the design process to establish commitments to sustainable operations policies included in the *Operations* section, and evaluate the impact of these protocols, during programming and design to ensure their integration.

Participating in the Pilot

The *Green Guide for Health Care Pilot Phase* will run for a minimum of one year. Design and facility management teams in any stage of design, construction or operation are invited to register their projects and participate in the Pilot program. Participants will be able to engage in the *Green Guide for Health Care* Forum – a dedicated web-based discussion where registered project team members can engage in peer-to-peer interchanges with other teams to discuss issues that arise and exchange ideas as they pursue achievement of credits in the *Guide*. While the GGHC Steering Committee and staff are unable to offer consultation on individual projects, the peer-to-peer discussions in this Forum should provide valuable support and ideas to participants. These discussions will also provide important experiential data to the GGHC Steering Committee and inform subsequent refinements to the *Guide*. Register your project and your team at the *Green Guide for Health Care* web site (www.gghc.org) to participate.

Relationship to LEED® Products

The *Green Guide for Health Care* has been informed by a number of important guidance documents that have preceded it. See the Reference Documents section below for access to these key documents.

The organizational structure on which the *Guide* is based has been borrowed by agreement from the U.S. Green Building Council's Leadership in Energy and Environmental Design Green Building Rating System® (LEED®). The *Guide* is not a LEED® Rating System and not a product of the U.S. Green Building Council. The LEED structure was largely mirrored in the *Guide* because it is a familiar and effective tool being used by a rapidly growing sector of the building design, construction, operations and maintenance industries.

For many credits, the *Green Guide for Health Care* directly incorporates the language of the parallel LEED credit, referencing LEED's New Construction, Existing Buildings and Commercial Interiors products. In some cases, existing LEED credits have been modified to respond to the unique needs and concerns of health care facilities. In others, new credits have been added beyond those in current LEED products. The Credit Summary provides more information on the source of credits. The *Guide* primarily follows the language in LEED-NC v.2.1. The Steering Committee is incorporating appropriate, health care relevant LEED-NC v.2.2 and LEED-EB language as it becomes available. In general, the *Guide* builds on the LEED family of products by addressing the particular structural, usage, and regulatory challenges of health care buildings and by emphasizing the environmental and public health issues that comprise an important part of what it means for a health care institution to address sustainability in their building portfolio.

Development History

The initiation of health care focused sustainable design tools began with the **Green Healthcare Construction Guidance Statement** published by the American Society for Healthcare Engineering (ASHE) in January 2002, representing the first sustainable design guidance document to emphasize a health-based approach.

The *Green Guide for Health Care* development initiative began in March 2003 with a professionally and geographically diverse group of green health care industry leaders convened as an independent Steering Committee to guide the document development (see the Steering Committee list). Working Groups for each section of the document drafted credit language that was reviewed and approved by the Steering Committee as a whole.

In December, 2003, Version 1.0 of the *Green Guidelines for Healthcare Construction* was released in draft form for public comment. More than 900 registrants downloaded the document during the public comment period from organizations representing a broad range of architectural, engineering, construction, health care, and manufacturing firms and industry associations. Between December 2003 and the close of the comment period on February 29, 2004, almost 1,200 public comments were received. A partial listing of those who submitted comments is included further in this Introduction. The Steering Committee reviewed all public comments prior to the drafting of Version 2.0.

In November 2004, Version 2.0 of the *Green Guide for Health Care* was released for general use in the Pilot phase.

Decision Making Process

The *Green Guide for Health Care* committee process is structured to include representation from a wide range of stakeholders and interests to ensure consistency and rigor in the document's development. Steering Committee membership, however, precludes organizations with direct financial interests in the products or certification services addressed by the document. Furthermore, this document is intended to be a best practices guide, not a basis for industry code or regulatory standard. For these reasons, the document is not intended to meet the legal definition of an industry "consensus based" standard.

Levels of Support

The Green Guide for Health Care welcomes support of its continued efforts through several options: *Supporters*, *Partners*, and *Endorsers*. Supporters, Partners and Endorsers affirm the intent and principles of the document (see the ASHE Green Healthcare Construction Guidance Statement - Statement of Principles) while not expressly endorsing every strategy or credit.

Sponsors provide a one time \$10,000 minimum donation. Sponsors' logos are displayed on the GGHC website home page, on the title page of the *Guide* and in the Supporters section of the document and the GGHC website. The Supporters' section listing includes a brief one sentence description of the Sponsor.

Partners provide a one time \$5,000 minimum donation or equivalent in-kind contribution, including organizational support for an active Steering Committee member or other significant contributor to the *Guide*. Partners are listed in the Supporters section of the document and the website and may, at their option, have their logo displayed on the Partners page of the GGHC website.

Endorsers agree to support the principles of the *Guide* and indicate their intent to use and promote the *Guide* within their organization or company. No direct financial or in-kind commitment is required to sign on as an Endorser. Endorsers are listed in the Supporters section of the document and on the GGHC website, which will be periodically updated.

Potential Partners are reviewed by the co-coordinators of the Guide. Sponsors are approved by the Steering Committee. Partner and Sponsor status is open to the following organizations:

- Design and Construction Firms
- Government Agencies
- Health Care Organizations/ Hospital Systems
- Insurers
- Non-Profit Organizations
- Professional Associations
- Private Foundations

To avoid potential conflicts of interest, manufacturers and their trade associations and product certifiers are ineligible for Sponsor or Partner status. All organizations and companies are welcome to support the *Guide* as Endorsers.

Contact info@gghc.org for further information about opportunities to support the GGHC.

Product Endorsement

The *Green Guide for Health Care* does not endorse products nor does it recommend for or against the purchase of specific products. In some instances, the *Guide* references product types that may be useful to address credit goals, considering price competitiveness, regulatory requirements, performance standards, and environmental/health impacts.

Green Guide Supporters

Convener:

The *Green Guide for Health Care* is convened by the **Center for Maximum Potential Building Systems**, a non-profit design firm established in 1975, engaged in life cycle design to foster ecological balance and actively pursues interdisciplinary collaborations with a common vision of healthful environments, economic prosperity, and social equity.



Sponsors:

The *Green Guide for Health Care* is currently sponsored by:



Hospitals for a Healthy Environment (H2E) - the joint pollution prevention project of the **American Hospital Association**, the **U.S. Environmental Protection Agency**, **Health Care Without Harm**, and the **American Nurses Association**.

The **Merck Family Fund** - A private foundation that seeks to restore and protect the natural environment and ensure a healthy planet for generations to come while strengthening the social fabric and the physical landscape of the urban community.



The **New York State Energy Research & Development Authority (NYSERDA)** – A public benefit corporation formed to use innovation and technology to solve some of New York's most difficult energy and environmental problems in ways that improve the State's economy.

Partners

The following organizations have provided critical direct or in-kind support to the development of the *Guide*:

American Society for Healthcare Engineering (ASHE), Chong Partners Architecture, CJL Engineering, Consorta, U.S. Environmental Protection Agency's ENERGY STAR® program, Guenther5 Architects, Guttman & Blaevoet, Healthy Building Network, Health Care Without Harm, Institute for a Sustainable Future, Kaiser Permanente, Mazzetti & Associates, Stantec Engineering, TLC Engineering, Tufts - New England Medical Center, Turner Construction Company, and WHR Architects.



CHONG | PARTNERS ARCHITECTURE



GUTTMAN & BLAEVOET
CONSULTING ENGINEERS



GUENTHER 5
ARCHITECTS, PLLC



Institute for a Sustainable Future



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Public Comment Period

During the Public Comment period from December 1, 2003 to February 29, 2004, over 900 people downloaded the *Guide*. More than 70 people submitted comments totaling almost 1200 entries. The comments received were broad reaching and constructive, ranging from probing critiques to enthusiastic endorsement. The Steering Committee has worked diligently to address the comments yielding a markedly improved 2.0 Pilot.

The following is a partial list of commenters who granted permission to publish their names. We list these individuals to acknowledge their contribution of ideas and efforts to the process. Listing here does not imply any endorsement by these individuals or their employers of the *Green Guide for Health Care*.

Kai Abelkis, Boulder Community Hospital	Brian Leet, Astorino
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Raj Daswani, Ove Arup	Lynn Preston, C&A Floorcoverings
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Jeanne Erickson, HKS, Inc.	John Roberts, IES Engineers
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Courtney France, Architectural Energy Corporation	Jessica Stuart, Chlorine Chemistry Council
David Gibney, HDR Inc.	Patrice Sutton, California Department of Health Services
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Mary Lamielle, National Center for Environmental Health Strategies	
Dera-Jill Lamontagne	
Gail Lee, Mills-Peninsula Health Services	

Reference Documents

The documents listed below have informed the overall development and content of the *Green Guide for Health Care*, though are not specifically referenced in the **Resources** sections associated with individual credits:

- **Green Healthcare Construction Guidance Statement**
American Society for Healthcare Engineering
http://www.ashe.org/ashe/products/pdfs/ashe_guidance_sustainconst_rev2_0410.pdf
- **LEED-NC®**(Leadership in Energy and Environmental Design)
Green Building Rating System for New Construction
Version 2.1 by the U.S. Green Building Council (USGBC)
<http://www.usgbc.org/leed>
- **LEED-EB®** Green Building Rating System for Existing Buildings
Version 2 by the U.S. Green Building Council
<http://www.usgbc.org/leed>
- **LEED-CI®** Green Building Rating System for Commercial Interiors
Pilot Version by the U.S. Green Building Council
<http://www.usgbc.org/leed>
- **Labs 21 Environmental Performance Criteria (EPC)**
Laboratories for the 21st Century, U.S. Environmental Protection Agency
<http://www.labs21century.gov/>
- **Green Star** Green Building Rating System
Green Building Council of Australia
<http://www.gbcaus.org/greenstar>
- **High Performance Building Guidelines**
New York City Department of Design and Construction, Office of Sustainable Design
<http://www.ci.nyc.ny.us/html/ddc/html/ddcgreen/>
- **2003 Savings By Design Healthcare Modeling Procedures**
Pacific Gas and Electric Company
<http://www.gghc.org/Documents/PGEModProc.pdf>
- **Greener Hospitals: Improving Environmental Performance,**
Edited by: Environment Science Center, Augsburg, Germany with support of Bristol-Myers Squibb
www.wzu.uni-augsburg.de/Publikationen/WZU_Publikationsreihe.html

Green Healthcare Construction Guidance Statement (2001)



Statement of Principles

The construction and use of buildings in the U.S. consumes 3 billion tons of raw materials annually (40% of raw stone, gravel, sand, and steel, 25% of virgin wood, 40% of energy resources, 75% of PVC, 17% of freshwater flows) and generates significant waste (25-40% of municipal solid waste from construction and demolition alone), 50% of CFCs, 30% of CO₂ production, and substantial toxic emissions.

Given this, the opportunities are significant to improve environmental quality through green planning, design, construction and operations and maintenance practices. Improving the environment through green construction practices is consistent with the American Hospital Association's recent voluntary agreement with the United States Environmental Protection Agency to reduce waste volume and toxicity.

Building design and construction practice can be shaped to protect health at three scales:

1) Protecting the immediate health of building occupants

The health of patients, staff, and visitors can be profoundly affected by the quality of the indoor air which in turn is dependent upon physical and mechanical design (such as ventilation and location of wastes and toxics), the choice of building materials, the management of construction emissions, and building operations and maintenance. Additionally, access to daylighting has been found to favorably affect staff productivity and patient outcomes.

2) Protecting the health of the surrounding community

Local air and water quality is also significantly affected by building design choices. Off-gassing building materials and finishes, construction equipment and HVAC systems directly emit VOCs, particulates and other materials that can result in the formation of ground level ozone (smog), and cause allergic attacks, respiratory problems and other illnesses. Land use and transportation planning, landscape and water management on the grounds and water conservation efforts within the building will influence the amount of toxic emissions released to the water and air throughout the life of the building.

3) Protecting the health of the global community and natural resources

The health impact of a building stretches far beyond its immediate community. The production of building materials can result in the release of persistent bioaccumulative toxic compounds, carcinogens, endocrine disruptors and other toxic substances. These compounds threaten communities where the materials are manufactured, and, because of the long life of some of these compounds, can risk the health of communities and ecosystems far from their release.

Climate change resulting from burning fossil fuels is expected to increase the spread of disease vectors far from their current regions and destabilize ecosystems, threatening worldwide nutrition. Loss of rainforests from unsustainable forestry can result in the loss of medicines and important genetic information that could help fight disease. Moreover, release of CFCs and HCFCs damages the stratospheric ozone layer, allowing increased levels of ultraviolet rays on Earth resulting in heightened potential for skin cancer.

The Importance of Prevention

Prevention is a fundamental principle of health care and public health. Indeed, to prevent disease is preferable to treating disease after it has occurred. In the face of uncertainty, precautionary action is appropriate to prevent harm. This public health approach makes sense both in the clinical setting and in responses to environmental and public health hazards. Similarly, a precautionary and preventive approach is an appropriate basis for decisions regarding material selection, design features, mechanical systems, infrastructure, and operations and maintenance practices.

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For reference to the full ASHE Construction Guidance Statement, refer to the Reference Documents section above.

Construction

Y - (yes) you are moderately confident that you can attain the credit.
? - (maybe) it will be challenging for this project and you are uncertain of your ability to attain it but you will try.
N - (no) while technically possible, you currently don't expect to try to achieve this credit in this project due to cost or other tradeoffs with project goals.
NA - (not applicable) it is inherently physically unattainable for this particular project regardless of effort due to physical conditions or project scope.

Note: an Excel spreadsheet of this checklist is available for download at www.gghc.org

Integrated Design

Y	Prereq 1	Integrated Design Process	Required
Y	Prereq 2	Environmental Health Mission Statement & Program	Required

Sustainable Sites

18 Points

Y	Prereq 1	Erosion & Sedimentation Control	Required
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Y	?	N	NA	Credit 1 Site Selection	1
Y	?	N	NA	Credit 2 Development Density	1
Y	?	N	NA	Credit 3.1 Brownfield Redevelopment: Basic Remediation Level	1
Y	?	N	NA	Credit 3.2 Brownfield Redevelopment: Residential Remediation Level	1
Y	?	N	NA	Credit 4.1 Alternative Transportation: Public Transportation Access	1
Y	?	N	NA	Credit 4.2 Alternative Transportation: Bicycle Storage & Changing Rooms	1
Y	?	N	NA	Credit 4.3 Alternative Transportation: Alternative Fuel Vehicles	1
Y	?	N	NA	Credit 4.4 Alternative Transportation: Parking Capacity	1
Y	?	N	NA	Credit 5.1 Reduced Site Disturbance: Protect or Restore Open Space	1
Y	?	N	NA	Credit 5.2 Reduced Site Disturbance: Development Footprint	1
Y	?	N	NA	Credit 6.1 Stormwater Management: Rate & Quantity	1
Y	?	N	NA	Credit 6.2 Stormwater Management: Treatment	1
Y	?	N	NA	Credit 7.1 Heat Island Effect: Non-Roof	1
Y	?	N	NA	Credit 7.2 Heat Island Effect: Roof	1
Y	?	N	NA	Credit 8 Light Pollution Reduction	1
Y	?	N	NA	Credit 9 Connection to the Natural World: Places of Respite	1
Y	?	N	NA	Credit 10.1 Community Contaminant Prevention: Airborne Releases	1
Y	?	N	NA	Credit 10.2 Community Contaminant Prevention: Leaks & Spills	1

Water Efficiency

7 Points

Y	Prereq 1	Potable Water Use for Equipment Cooling	Required
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Y	?	N	NA	Credit 1.1 Water Efficient Landscaping: Reduce Potable Water Use by 50%	1
Y	?	N	NA	Credit 1.2 Water Efficient Landscaping: No Potable Water Use or No Irrigation	1
Y	?	N	NA	Credit 2 Innovative Wastewater Technologies	1
Y	?	N	NA	Credit 3.1 Domestic Potable Water Use Reduction: 20%	1
Y	?	N	NA	Credit 3.2 Domestic Potable Water Use Reduction: 30%	1
Y	?	N	NA	Credit 4.1 Process Water Use Reduction: Measurement & Verification	1
Y	?	N	NA	Credit 4.2 Process Water Use Reduction: No or Low Water Use Building System Equipment	1

Energy & Atmosphere

19 Points

Y	Prereq 1	Fundamental Building Systems Commissioning	Required
Y	Prereq 2	Minimum Energy Performance	Required
Y	Prereq 3	CFC Reduction in HVAC&R Equipment	Required

Y	?	N	NA	Credit 1.1	Optimize Energy Performance: 5%	1
Y	?	N	NA	Credit 1.2	Optimize Energy Performance: 10%	1
Y	?	N	NA	Credit 1.3	Optimize Energy Performance: 15%	1
Y	?	N	NA	Credit 1.4	Optimize Energy Performance: 20%	1
Y	?	N	NA	Credit 1.5	Optimize Energy Performance: 25%	1
Y	?	N	NA	Credit 1.6	Optimize Energy Performance: 30%	1
Y	?	N	NA	Credit 1.7	Optimize Energy Performance: 35%	1
Y	?	N	NA	Credit 1.8	Optimize Energy Performance: 40%	1
Y	?	N	NA	Credit 2.1	Renewable Energy: 1%	1
Y	?	N	NA	Credit 2.2	Renewable Energy: 2%	1
Y	?	N	NA	Credit 2.3	Renewable Energy: 5%	1
Y	?	N	NA	Credit 3	Additional Commissioning	1
Y	?	N	NA	Credit 4	Refrigerant Selection	1
Y	?	N	NA	Credit 5	Measurement & Verification	1
Y	?	N	NA	Credit 6.1	Energy Supply Efficiency. 10%	1
Y	?	N	NA	Credit 6.2	Energy Supply Efficiency. 15%	1
Y	?	N	NA	Credit 6.3	Energy Supply Efficiency. 17%	1
Y	?	N	NA	Credit 6.4	Energy Supply Efficiency. 18%	1
Y	?	N	NA	Credit 7	Medical Equipment Efficiency	1

Materials & Resources

24 Points

Y	Prereq 1	Storage & Collection of Recyclables	Required
Y	Prereq 2	Mercury Elimination	Required

Y	?	N	NA	Credit 1.1	Building Reuse: Maintain 40% of Existing Walls, Floors & Roof	1
Y	?	N	NA	Credit 1.2	Building Reuse: Maintain 80% of Existing Walls, Floors & Roof	1
Y	?	N	NA	Credit 1.3	Building Reuse: Maintain 50% of Interior Non-Structural Elements	1
Y	?	N	NA	Credit 2.1	Construction Waste Management: Divert 50% from Landfill & Incineration	1
Y	?	N	NA	Credit 2.2	Construction Waste Management: Divert 75% from Landfill & Incineration	1
Y	?	N	NA	Credit 2.3	Construction Practices: Site & Materials Management	1
Y	?	N	NA	Credit 2.4	Construction Practices: Utility & Emissions Control	1
Y	?	N	NA	Credit 3.1	Resource Reuse 5%	1
Y	?	N	NA	Credit 3.2	Resource Reuse 10%	1
Y	?	N	NA	Credit 4.1	Recycled Content: 10%	1
Y	?	N	NA	Credit 4.2	Recycled Content: 20%	1
Y	?	N	NA	Credit 5.1	Regional Materials: 10%	1
Y	?	N	NA	Credit 5.2	Regional Materials: 20%	1
Y	?	N	NA	Credit 6	Rapidly Renewable Materials: 5%	1
Y	?	N	NA	Credit 7	Certified Wood	1
Y	?	N	NA	Credit 8.1	PBT Elimination: Dioxins	1
Y	?	N	NA	Credit 8.2	PBT Elimination: Mercury Use in Equipment	1
Y	?	N	NA	Credit 8.3	PBT Elimination: Lead & Cadmium	1

Materials & Resources continued

Y	?	N	NA	Credit 9.1 Furniture & Medical Furnishings: Resource Reuse	1
Y	?	N	NA	Credit 9.2 Furniture & Medical Furnishings: Materials	1
Y	?	N	NA	Credit 9.3 Furniture & Medical Furnishings: Manufacturing, Transportation & Recycling	1
Y	?	N	NA	Credit 10 Copper Reduction	1
Y	?	N	NA	Credit 11.1 Resource Use: Design for Flexibility	1
Y	?	N	NA	Credit 11.2 Resource Use: Minimize Materials	1

Environmental Quality

24 Points

Y		Prereq 1	Minimum IAQ Performance	Required
Y		Prereq 2	Asbestos Removal or Encapsulation	Required

Y	?	N	NA	Credit 1 Air Quality Monitoring	1
Y	?	N	NA	Credit 2 Increase Ventilation Effectiveness	1
Y	?	N	NA	Credit 3.1 Construction IAQ Management Plan: During Construction	1
Y	?	N	NA	Credit 3.2 Construction IAQ Management Plan: Before Occupancy	1
Y	?	N	NA	Credit 4.1 Low-Emitting Materials: Interior Adhesives & Sealants	1
Y	?	N	NA	Credit 4.2 Low-Emitting Materials: Wall & Ceiling Finishes	1
Y	?	N	NA	Credit 4.3 Low-Emitting Materials: Flooring Systems	1
Y	?	N	NA	Credit 4.4 Low-Emitting Materials: Composite Wood & Insulation	1
Y	?	N	NA	Credit 4.5 Low-Emitting Materials: Furniture & Medical Furnishings	1
Y	?	N	NA	Credit 4.6 Low-Emitting Materials: Exterior Applied Products	1
Y	?	N	NA	Credit 5.1 Chemical & Pollutant Source Control: Outdoor	1
Y	?	N	NA	Credit 5.2 Chemical & Pollutant Source Control: Indoor	1
Y	?	N	NA	Credit 6.1 Controllability of Systems: Lighting	1
Y	?	N	NA	Credit 6.2 Controllability of Systems: Thermal & Ventilation	1
Y	?	N	NA	Credit 7 Continuous Comfort Monitoring System	1
Y	?	N	NA	Credit 8.1a Daylight & Views: Daylight for Occupied Spaces: 34-48% flr w/in 15'	1
Y	?	N	NA	Credit 8.1b Daylight & Views: Daylight for Occupied Spaces: 38-56% flr w/in 15'	1
Y	?	N	NA	Credit 8.1c Daylight & Views: Daylight for Occupied Spaces: 42-64% flr w/in 15'	1
Y	?	N	NA	Credit 8.1d Daylight & Views: Daylight for Occupied Spaces: 90% access to daylight	1
Y	?	N	NA	Credit 8.1e Daylight & Views: Daylight for Occupied Spaces: 2% DF for 75% of staff	1
Y	?	N	NA	Credit 8.2 Daylight & Views: Building Orientation	1
Y	?	N	NA	Credit 8.3 Daylight & Views: Views for Occupied Spaces	1
Y	?	N	NA	Credit 8.4 Daylight & Views: Lighting & Circadian Rhythm	1
Y	?	N	NA	Credit 9 Acoustic Environment	1

Innovation in Design

4 Points

Y	?	N	Credit 1.1 Innovation in Design:	1
Y	?	N	Credit 1.2 Innovation in Design	1
Y	?	N	Credit 1.3 Innovation in Design	1
Y	?	N	Credit 1.4 Innovation in Design	1

Construction Project Total

96 Points

Operations

Integrated Operations

5 Points

Y	Prereq 1	Integrated Operations & Maintenance Process	Required
Y	Prereq 2	Recertification Process	Required
Y	Prereq 3	Environmental Tobacco Smoke Control	Required
Y	Prereq 4	Outside Air Introduction & Exhaust Systems	Required

Y	?	N	NA	Credit 1.1	Building Operations & Maintenance: Staff Education	1
Y	?	N	NA	Credit 1.2	Building Operations & Maintenance: Building Systems Maintenance	1
Y	?	N	NA	Credit 1.3	Building Operations & Maintenance: Building Systems Monitoring	1
Y	?	N	NA	Credit 2.1	IAQ Management: Maintaining Indoor Air Quality	1
Y	?	N	NA	Credit 2.2	IAQ Management: Reduce Particulates in Air Distribution	1

Transportation Operations

3 Points

Y	?	N	NA	Credit 1.1	Alternative Transportation: Public Transit Access	1
Y	?	N	NA	Credit 1.2	Alternative Transportation: Low Emitting & Fuel Efficient Vehicles	1
Y	?	N	NA	Credit 1.3	Alternative Transportation: Car Pool Programs	1

Energy Efficiency

18 Points

Y	Prereq 1	Existing Building Commissioning	Required
Y	Prereq 2	Minimum Energy Performance	Required
Y	Prereq 3	Ozone Protection	Required

Y	?	N	NA	Credit 1.1	Optimize Energy Performance: Energy Star score of 63	1
Y	?	N	NA	Credit 1.2	Optimize Energy Performance: Energy Star score of 67	1
Y	?	N	NA	Credit 1.3	Optimize Energy Performance: Energy Star score of 71	1
Y	?	N	NA	Credit 1.4	Optimize Energy Performance: Energy Star score of 75	1
Y	?	N	NA	Credit 1.5	Optimize Energy Performance: Energy Star score of 79	1
Y	?	N	NA	Credit 1.6	Optimize Energy Performance: Energy Star score of 83	1
Y	?	N	NA	Credit 1.7	Optimize Energy Performance: Energy Star score of 87	1
Y	?	N	NA	Credit 1.8	Optimize Energy Performance: Energy Star score of 91	1
Y	?	N	NA	Credit 1.9	Optimize Energy Performance: Energy Star score of 95	1
Y	?	N	NA	Credit 1.10	Optimize Energy Performance: Energy Star score of 99	1
Y	?	N	NA	Credit 2.1	On-Site & Off-Site Renewable Energy: 1% on or 5% off	1
Y	?	N	NA	Credit 2.2	On-Site & Off-Site Renewable Energy: 2% on or 10% off	1
Y	?	N	NA	Credit 2.3	On-Site & Off-Site Renewable Energy: 5% on or 25% off	1
Y	?	N	NA	Credit 2.4	On-Site & Off-Site Renewable Energy: 10% on or 50% off	1
Y	?	N	NA	Credit 3	Energy Efficient Equipment	1
Y	?	N	NA	Credit 4	Refrigerant Selection	1
Y	?	N	NA	Credit 5.1	Performance Measurement: Enhanced Metering	1
Y	?	N	NA	Credit 5.2	Performance Measurement: Emission Reduction Reporting	1

Water Conservation

8 Points

<input type="checkbox"/>				Prereq 1	Minimum Water Efficiency	Required
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 1.1	Water Efficient Landscaping: Reduce potable water use by 50%	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 1.2	Water Efficient Landscaping: Eliminate potable water use	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 2.1	Building Water Use Reduction: Reduce fixture use by 10%	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 2.2	Building Water Use Reduction: Reduce fixture use by 20%	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 3.1	Process Water Efficiency : Reduce 20%	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 3.2	Process Water Efficiency : Reduce 30%	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 3.3	Process Water Efficiency : Reduce 40%	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 4	Enhanced Metering	1

Chemical Management

5 Points

<input type="checkbox"/>				Prereq 1	Polychlorinated Biphenyl (PCB) Removal	Required
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 1.1	Community Contaminant Prevention: Airborne Releases	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 1.2	Community Contaminant Prevention: Leaks & Spills	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 2	Indoor Pollutant Source Control: High Hazard Chemicals	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 3.1	Chemical Discharge: Chemical Waste Minimization Plan	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 3.2	Chemical Discharge: Pharmaceutical Waste Discharge	1

Waste Management

6 Points

<input type="checkbox"/>				Prereq 1	Waste Stream Audit	Required
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 1.1	Total Waste Reduction: 30%	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 1.2	Total Waste Reduction: 40%	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 1.3	Total Waste Reduction: 50%	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 2.1	Regulated Medical Waste Reduction: <10%	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 2.2	Regulated Medical Waste Reduction: Minimize incineration	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 3	Food Waste Reduction	1

Environmental Services

9 Points

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 1.1	Outdoor Grounds & Building Exterior Management : 4 items	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 1.2	Outdoor Grounds & Building Exterior Management : 4 more	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 2	Indoor Integrated Pest Management	2
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 3	Environmentally Preferable Cleaning Policy	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 4.1	Sustainable Cleaning Products & Materials: 30% of annual purchases	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 4.2	Sustainable Cleaning Products & Materials: 60% of annual purchases	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 4.3	Sustainable Cleaning Products & Materials: 90% of annual purchases	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 5	Environmentally Preferable Janitorial Equipment	1

Environmentally Preferable Purchasing 11 Points

Y	?	N	NA	Credit 1.1	Food: Organic or Sustainable	1
Y	?	N	NA	Credit 1.2	Food: Antibiotics	1
Y	?	N	NA	Credit 1.3	Food: Local Production / Food Security	1
Y	?	N	NA	Credit 2	Janitorial Paper & Other Disposable Products	1
Y	?	N	NA	Credit 3	Electronics Purchasing & Take Back	1
Y	?	N	NA	Credit 4.1	Toxic Reduction: Mercury	1
Y	?	N	NA	Credit 4.2	Toxic Reduction: DEHP	1
Y	?	N	NA	Credit 4.3	Toxic Reduction: Natural Rubber Latex	1
Y	?	N	NA	Credit 5	Furniture & Medical Furnishings	1
Y	?	N	NA	Credit 6.1	IAQ Compliant Products: 45% of annual purchases	1
Y	?	N	NA	Credit 6.2	IAQ Compliant Products: 90% of annual purchases	1

Innovation in Operation 7 Points

Y	?	N		Credit 1.1	Innovation in Operation	1
Y	?	N		Credit 1.2	Innovation in Operation	1
Y	?	N		Credit 1.3	Innovation in Operation	1
Y	?	N		Credit 1.4	Innovation in Operation	1
Y	?	N		Credit 2	Documenting Sustainable Operations Business Case Impacts	1
Y	?	N		Credit 3.1	Documenting Productivity Impacts: Absenteeism & Healthcare Costs	1
Y	?	N		Credit 3.2	Documenting Productivity Impacts: Other Productivity Impacts	1

Operations Project Total 72 Points

Key
Y - (yes) you are moderately confident that you can attain the credit.
? - (maybe) it will be challenging for this project and you are uncertain of your ability to attain it but you will try.
N - (no) while technically possible, you currently don't expect to try to achieve this credit in this project due to cost or other tradeoffs with project goals.
NA - (not applicable) it is inherently physically unattainable for this particular project regardless of effort due to physical conditions or project scope.
 Examples would include: Credits SS 3.1 & 3.2 (Brownfield redevelopment) for a project not on a brownfield site, MR Credits 1.1 - 1.3 (Building reuse) if no portions of an existing building are part of the project, EQ Credit 8.1, 4th 7 5th points (Daylight & Views: inpatient) if there are no facilities for inpatients, and SS Credit 7.1 & 2 (Heat island effect) if the scope of the project is only interior renovation

Credit Summary

This section summarizes the intent and goals of credits in the Construction and Operations sections.

The Source column indicates the relationship of the base credit language to the LEED® system:

LEED = credit language is as per LEED-NC® 2.1 or LEED-EB®

Mod = credit language is modified from LEED by the GGHC Steering Committee**.

New = credit is new to the GGHC, not in LEED

Both the Green Guide Construction and Operations section combine some strategies found in LEED products with new credits. Many of the borrowed credits have been modified by the GGHC Steering Committee, and fulfillment of the modified credits may or may not meet the requirements of LEED. The user must review the appropriate LEED documents to determine potential LEED status of a project.

The Construction section borrows heavily from LEED-NC 2.1 and maintains the same organizing structure and numbering.

The Operations section borrows a number of strategies found in LEED products – both LEED-EB and LEED-NC - as well as in ISO 14001 Certification standards with some strategies that are new to the Guide. Because the Green Guide Operations section structure does not follow LEED category structure, the user is advised to carefully review each document for corresponding credit language.

Construction Integrated Design

Title	Intent	Credit Goals	Source
ID Prereq 1 Integrated Design	Achieve an effective collaborative design process and outcome by engaging the multiple design disciplines, as well as users, constructors, facility managers and operations personnel.	Use cross discipline design and decision making starting early in the process & continuing throughout to take advantage of interrelationships between systems. Include representation early on in the design process from all end user stakeholders, including owners, physician teams, nursing, administrators, support services, housekeeping staff, and engineering/maintenance personnel.	New
ID Prereq 2 Environmental Health Mission Statement & Program	Establish environmental health goals and use as a basis for selection and implementation of building design, construction, and operational strategies.	Prepare an environmental health mission statement and program to complement the facility's functional design program. This environmental health program shall be retained by the facility with the other design data to assure that future alterations, additions, and program changes are consistent with the intent of the environmental health program.	New

Sustainable Sites

<i>Title</i>	<i>Intent</i>	<i>Credit Goals</i>	<i>Source</i>
SS PreReq 1 Erosion & Sedimentation Control	Control erosion to reduce negative impacts on water and air quality.	Develop a site sediment and erosion control plan, specific to the site, that conforms to United States Environmental Protection Agency (EPA) Document No. EPA-832R-92-005 (September 1992), Storm Water Management for Construction Activities, Chapter 3, OR local erosion and sedimentation control standards and codes, whichever is more stringent.	LEED
SS 1 Site Selection	Avoid development of inappropriate sites and reduce the environmental impact from the location of a building on a site.	Do not develop buildings, roads or parking areas on portions of sites that meet any one of the following criteria: prime farmland, land whose elevation is lower than 5 feet above the elevation of the 100-year flood, land which is specifically identified as habitat for any species on the Federal or State threatened or endangered lists, land within 100 feet of any water including wetlands isolated wetlands or areas of special concern identified by state or local rule, land which prior to acquisition for the project was public parkland, unless land of equal or greater value as parkland is accepted in trade by the public landowner	LEED
SS 2 Development Density	Channel development to urban areas with existing infrastructures, protect greenfields and preserve habitat and natural resources. In rural areas, increase development density on existing or previously developed sites rather than undeveloped rural land.	Increase localized density to conform to governmental density goals by utilizing sites that are located within an existing minimum development density of 80,000 square feet per acre (two story downtown development), OR For previously developed rural sites, increase density of the existing site to a minimum development density of 30,000 square feet per acre.	Mod
SS 3.1 Brownfield Redevelopment : Basic Remediation Level	Rehabilitate damaged sites where development is complicated by real or perceived environmental contamination, reducing pressure on undeveloped land.	Develop on a site documented as contaminated OR on a site classified as a brownfield by a local, state or federal government agency. Effectively remediate site contamination.	LEED
SS 3.2 Brownfield Redevelopment : Residential Remediation Level		Same as 3.1 and remediate the site to the residential level as defined by the EPA Region 9 Preliminary Remediation Guidelines. Verify that the site is not within 2000 feet of another site documented as contaminated OR a site classified as a brownfield by a local, state, or federal government agency, unless remediated to the residential level.	New
SS 4.1 Public Transportation Access	Reduce pollution and land development impacts from automobile use.	Locate the building entrance within 1/2 mile of a commuter rail, light rail or subway station or 1/4 mile of two or more public or campus bus lines usable by building occupants.	LEED
SS 4.2 Bicycle Storage & Changing Rooms	Reduce pollution and land development impacts from automobile use.	Provide secure bicycle storage with convenient changing/shower facilities (within 200 yards of the building) for 3% or more of peak building day shift staff. Provide one shower per 8 cyclists. (Staff shower facilities within building may be counted.)	Mod
SS 4.3 Alternative Fuel Vehicles	Reduce pollution from local emissions of fossil-fuel combustion powered vehicles.	Provide preferred parking and fueling stations for a 100% alternative fuel fleet if that fleet comprises a minimum of 50% of total fleet mileage driven annually, OR Install alternative-fuel refueling station(s) for 3% of the total vehicle parking capacity of the site, OR Provide preferred parking programs for hybrid or alternative fuel vehicles for at least 10% of the total vehicle parking capacity.	Mod
SS 4.4 Parking Capacity	Reduce pollution and land development impacts from single occupancy vehicle use.	Size parking capacity to meet, but not exceed, minimum local zoning requirements OR health department regulatory authority, whichever is the overriding requirement, AND provide preferred parking for carpools or vanpools capable of serving 5% of the total building staff AND Limit overall open-air paved vehicular circulation and parking area to 350 sf/stall.	Mod

Title	Intent	Credit Goals	Source
SS 5.1 Reduced Site Disturbance: Protect or Restore Open Space	Conserve, preserve, and enhance existing natural areas and restore damaged areas to provide habitat for native flora and fauna and promote biodiversity.	On greenfield sites, limit site disturbance to 40 feet beyond the building perimeter, 15 feet beyond primary roadway curbs, 8 feet beyond walkways, 10 feet from the centerline of main utility trenches, and 10 feet beyond constructed areas with permeable surfaces that require additional staging areas. Protect and encourage the development of native vegetation, OR On previously developed sites, restore a minimum of 50% of the site area (excluding the building footprint) by replacing impervious surfaces with emphasis on native species and limited use of adapted non-invasive species.	Mod
SS 5.2 Reduced Site Disturbance: Development Footprint		Reduce the development footprint (entire building footprint, access roads and parking) so that open space on the site exceeds the local zoning requirement by 25%. For areas with no local zoning requirements, dedicate open space area adjacent to the building that is equal to the development footprint.	LEED
SS 6.1 Stormwater Management: Rate & Quantity	Limit disruption to channel stability and pollution of natural water flows by implementing a channel protection strategy.	If existing imperviousness is $\leq 50\%$, establish a stormwater management plan that protects downstream channel stability using a recognized channel protection strategy to prevent the post-development 2 year, 24 hour peak discharge rate from exceeding the pre-development rate, OR If existing imperviousness is $> 50\%$, establish a stormwater management plan that results in a 25% decrease in the rate and quantity of runoff from the 1-year 24-hour design storm.	Mod
SS 6.2 Stormwater Management: Treatment		Establish a stormwater treatment systems plan that maintains annual groundwater recharge rates by promoting nonstructural practices and infiltration and captures and treats the runoff volume from either 90% of the average annual rainfall or 1" (2.54 cm) of rainfall.	Mod
SS 7.1 Heat Island Effect: Non-Roof	Reduce heat islands to minimize impact on microclimate and human and wildlife habitat.	Provide shade (within 5 years) and/or use light-colored, high-albedo and/or open grid pavement with a Solar Reflectance Index (SRI) of at least 30 for at least 30% of the site's hardscape.	Mod
SS 7.2 Heat-Island: Roof		Use Energy Star® compliant (highly reflective) AND high emissivity roofing (emissivity of at least 0.9 when tested in accordance with ASTM 408) roofing having a Solar Reflectance Index (SRI) as required in Table 2 for a minimum of 75% of the roof surface, OR Install a "green" (vegetated) roof for at least 50% of the roof area. Combinations of high albedo SRI roof and vegetated roof can be used.	Mod
SS 8 Light Pollution Reduction	Eliminate light trespass from the building and site, improve night sky access, and reduce development impact on nocturnal environments.	Meet light levels and uniformity ratios recommended by the Illuminating Engineering Society of North America (IESNA) <i>Recommended Practice Manual: Lighting for Exterior Environments</i> (RP-33-99). Design exterior lighting such that all exterior luminaires with more than 1000 initial lamp lumens are shielded and all luminaires with more than 3500 initial lamp lumens meet the Full Cutoff IESNA Classification. Assure that the maximum candela value of all interior lighting falls within the building (not out through windows) and of all exterior lighting falls within the property. Assure that any luminaire within a distance of 2.5 times its mounting height from the property boundary has shielding such that no light from that luminaire crosses the property boundary. Zone and control lights to allow for limiting night-time lighting to the Emergency Department, a small employee parking area, a small visitor parking area, pedestrian walkways, and circulation routes.	Mod
SS 9 Connection to the Natural World: Places of Respite	Provide places of respite on the health care campus to connect health care patients, visitors, and staff to the natural environment.	Establish 5% of the net usable program area as specifically programmed places of respite with direct connection to the natural environment for patients, visitors, and staff. Provide at least one place of respite dedicated to staff and separate from patients and visitors. Provide at least one outdoor place of respite conveniently located and easily accessible and identifiable to patients and visitors and at least one outdoor place of respite dedicated to staff designated as non-smoking.	New
SS 10.1 Community Contaminant Prevention: Airborne Releases	Minimize building airborne effluents and environments, safety, and health impacts to site and neighbors.	Exceed by 10% the NIH-CDC Guidelines for Airborne Effluent from Laboratories that Handle Biohazards. Meet all standards of California South Coast Air Quality Management District for all products of combustion.	New (EPC)
SS 10.2 Community Contaminant Prevention: Leaks & Spills	Prevent releases of hazardous chemicals and fuels to storm sewer.	Establish oil interceptors at all drains from parking areas and central plant areas. Comply with California Health & Safety Code Section 25290.1 and 25291 for the installation of fuel oil storage tanks to prevent release of diesel fuels.	New (EPC)

Water Efficiency

Title	Intent	Credit Goals	Source
WE Prereq 1 Potable Water Use for Equipment Cooling	Eliminate potable water use for equipment cooling.	Do not use potable water for once through cooling for any equipment. (Does not apply to potable water for cooling tower makeup, or for other evaporative cooling systems; refer to Credit 4 for Process Water.)	New
WE 1.1 Water Efficient Landscaping: Reduce Potable Water Use by 50%	Limit or eliminate the use of potable water for landscape irrigation.	Reduce potable water consumption from irrigation by at least 50% over conventional means. Landscaped area must include a minimum of one-half acre outside of the building. Do not use water from wells or rivers for site irrigation purposes.	Mod
WE 1.2 Water Efficient Landscaping: No Potable Water Use or No Irrigation		Use only captured rain or recycled site water to eliminate all potable water consumption for site irrigation (except for initial watering to establish plants). Landscaped area must include a minimum of one-half acre outside of the building. Do not use water from wells or rivers for site irrigation purposes. OR Do not install permanent landscape irrigation systems.	Mod
WE 2 Innovative Wastewater Technologies	Reduce generation of wastewater and potable water demand, while increasing the local aquifer recharge.	Reduce the use of municipally provided potable water for building sewage conveyance by a minimum of 50%, OR Treat 100% of wastewater on-site to tertiary standards.	LEED
WE 3.1 & 3.2 Domestic Potable Water Use Reduction	Maximize potable water efficiency within buildings to reduce the burden on municipal water supply and wastewater systems.	Credit 3.1 - Employ strategies that in aggregate use 20% less water than the water use baseline calculated for the building after meeting the Energy Policy Act of 1992 fixture performance requirements.	LEED
		Credit 3.2 - Employ strategies that in aggregate use 30% less water than the water use baseline.	LEED
WE 4.1 Process Water Use Reduction: Measurement & Verification	Provide for the ongoing accountability and optimization of building water consumption performance over time.	Provide for long term continuous measurement of potable water uses within the facility. Provide individual meters for the following water uses (as applicable to the project): laboratory, dietary department, central sterile and processing department, laundry, radiology and imaging department, surgical suite, purified water system and filter backwash water, outdoor irrigation systems, cooling tower make-up and filter backwash water, steam boiler system make-up water, and closed loop hydronic system make-up water.	New
WE 4.2 Process Water Use Reduction: Low or No Water Use Building System Equipment	Reduce or eliminate the use of potable water for non-potable process use in building system equipment.	Use building system equipment (pumps, compressors, cooling towers, etc.) that reduce the use of potable water by at least 10% in comparison to that of comparable equipment that use potable water for a process use. Minimum water savings must be at least 100,000 gallons annually.	New

Energy & Atmosphere

<i>Title</i>	<i>Intent</i>	<i>Credit Goals</i>	<i>Source</i>
EA Prereq 1 Fundamental Building Systems Commissioning	Verify and ensure that fundamental building elements and systems are designed, installed and calibrated to operate as intended.	Establish or have a contract in place to establish the following best practice commissioning procedures: Engage a commissioning team that does not include individuals directly responsible for project design or construction management. Review the design intent and the basis of design documentation. Incorporate commissioning goals into the construction documents. Develop and utilize a commissioning plan. Verify installation, functional performance, training and operation and maintenance documentation. Complete a commissioning report.	LEED
EA Prereq 2 Minimum Energy Performance	Establish the minimum level of energy efficiency for the base building and systems.	Model anticipated energy performance using DOE2.1E or Energy Plus. Design to meet or exceed ASHRAE/IESNA 90.1-2004 of local energy, whichever is stricter unless regulatory requirements exempt facility from portions of the code in which case meet or exceed baseline defined in the credit, AND Create an estimate of whole building energy consumption as defined in the credit and determine the Energy Performance Rating using EPA's Target Finder rating tool and submit.	Mod
EA Prereq 3 CFC Reduction in HVAC&R Equipment	Reduce ozone depletion.	Zero use of CFC-based refrigerants in new base building HVAC&R systems. When reusing existing base building HVAC equipment that currently uses CFC refrigerants, create and implement a comprehensive CFC phase-out plan.	LEED
EA 1 Optimize Energy Performance	To achieve increasing levels of energy performance to reduce environmental impacts associated with excessive energy use.	Model anticipated energy performance using DOE2.1E or Energy Plus and compare to baseline as defined in EA Prerequisite 2. For healthcare buildings exempt from ASHRAE 90.1, document through modeling, a reduction in energy consumption of the proposed design when compared to the baseline design. For others document a reduction in energy cost budget as per ASHRAE 90.1	Mod
		Credit 1.1 Reduce design energy consumption by 5%/ cost by 10%	
		Credit 1.2 Reduce design energy consumption by 10%/cost by 15%	
		Credit 1.3 Reduce design energy consumption by 15% / cost by 20%	
		Credit 1.4 Reduce design energy consumption by 20% / cost by 25%	
		Credit 1.5 Reduce design energy consumption by 25% / cost by 30%	
		Credit 1.6 Reduce design energy consumption by 30% / energy cost by 35%	
		Credit 1.7 Reduce design energy consumption by 35% / energy cost by 40%	
Credit 1.8 Reduce design energy consumption by 40% / energy cost by 45%			
EA 2 Renewable Energy	Encourage use of renewable energy technologies to reduce fossil fuel energy use.	Supply a net fraction of the building's total energy use with on-site renewable energy sources.	Mod
		Credit 2.1 Renewable energy, 1% contribution	
		Credit 2.2 Renewable energy, 2% contribution	
		Credit 2.3 Renewable energy, 5% contribution	
EA 3 Additional Commissioning	Verify and ensure that the entire building is designed, constructed and calibrated to operate as intended.	Contract with a commissioning authority independent of the design team to review: the design prior to the construction document phase; the construction documents near completion of the construction document development and prior to issuing the contract documents for construction; and the contractor submittals relative to systems being commissioned. Provide the Owner with a single manual that contains the information required for re-commissioning building systems. Have a contract in place to review building operation with O&M staff, including a plan for resolution of outstanding commissioning-related issues within one year after construction completion date.	LEED
EA 4 Refrigerant Selection	Reduce ozone depletion and global climate change effects through the proper selection of chillers refrigerants.	Install base building level HVAC and refrigeration equipment with combined low ozone depletion and global warming potential.	LEED (as per TSAC)
EA 5 Measurement & Verification	Provide for the ongoing accountability and optimization of building energy consumption performance over time.	Provide for long term continuous measurement of substantive energy and water uses within the facility. At a minimum, provide metering for the following electrical and mechanical systems (as applicable to the scope of the project): Lighting system power and controls Motor loads (including air compressors, vacuum pumps and boiler systems) Chillers and Air distribution systems Data Centers Critical Equipment Electrical Distribution Systems	Mod

Title	Intent	Credit Goals	Source
EA 6 Energy Supply Efficiency	Reduce the total non-renewable source energy required for the facility through increased energy supply efficiency.	Calculate the percentage reduction in the total annual non-renewable source energy, achieved through the use of combined heat and power systems, or other methods of cascading energy recovery of primary fuel supplies (commonly know as "cogeneration").	New
		Credit 6.1 Reduce source energy use by at least 10%	
		Credit 6.2 Reduce source energy use by at least 15%	
		Credit 6.3 Reduce source energy use by at least 17%	
		Credit 6.4 Reduce source energy use by at least 18%	
EA 7 Medical Equipment Efficiency	Reduce energy consumption by using efficient medical and other equipment.	Use Energy Star® qualified equipment or equipment in the top 25th percentile for energy consumption for that class of equipment for at least 75% (quantity, not cost) of the new medical equipment that is not building systems related.	New

Materials & Resources

<i>Title</i>	<i>Intent</i>	<i>Credit Goals</i>	<i>Source</i>
MR Prereq 1 Storage & Collection of Recyclables	Reduce solid waste disposal in landfills and incinerators through reduction, reuse, recycling and composting.	Establish a collection system and controlled areas serving the entire building dedicated to the separation, storage, and collection of materials for recycling including (at a minimum) newsprint, paper, corrugated cardboard, glass, plastics, metals, fluorescent lamps (tube, compact fluorescent and HID) and batteries.	Mod
MR Prereq 2 Mercury Elimination	Eliminate stand alone mercury-containing building products and reduce mercury discharge through product substitution and capture.	Eliminate thermostats, switches and other stand-alone mercury containing measurement devices in building control systems. Specify and install low mercury fluorescent tubes and compact fluorescent lamps, and low mercury high intensity discharge bulbs such that average mercury content in fluorescent tubes and compact fluorescent lamps does not exceed 5 mg of mercury, and that high intensity discharge lamps have the lowest available mercury content. Plan for capture of historical mercury sources in demolition. Collect mercury devices for recycling. In facilities delivering dental care, install amalgam separation devices.	New
MR 1 Building Reuse	Extend the life cycle of existing building stock, conserve resources, retain cultural resources, reduce waste and environmental impacts of manufacturing and transport of new building materials.	Credit 1.1 Use existing structure (including structural floor and roof decking) and envelope (exterior skin and framing, excluding window assemblies and non-structural roofing material) to comprise at least 40% of completed building (including additions).	Mod
		Credit 1.2 Use existing structure and envelope in an additional 40% (80% total) of existing building structure and shell.	Mod
		Credit 1.3 Reuse existing non-shell elements (interior walls, doors, floor coverings, and ceiling systems) in at least 50% of completed building (including additions).	Mod
MR 2.1 & 2.2 Construction Waste Management: Divert from Landfill & Incineration	Divert construction and demolition debris from disposal in landfills and incinerators. Redirect recyclable recovered resources back to manufacturing.	Develop and implement a waste management plan. Define process for surveying and assessing hazardous materials in the existing building. Recycle and/or salvage at least 50% of non-hazardous construction and demolition debris.	Mod
		Recycle and/or salvage an additional 25% (75% total) of non-hazardous construction and demolition debris.	
MR 2.3 Construction Practices: Site & Materials Management	Implement site and materials management practices during construction to minimize adverse impacts on adjacent occupants.	Construction Practices Environmental Management System (EMS): Develop and implement an EMS for construction & pre-occupancy phases of the building including the following:	New
		Site Utilization: Compile a site access plan to minimize site disruption associated with the project's construction phase. Develop measures to protect priority sensitive areas of the site.	
		Temporary Facilities: Utilize salvaged or refurbished materials for construction of temporary facilities, but avoid reuse of pressure treated lumber or lumber with lead paint. Make all temporary facilities weathertight.	
		Delivery, Storage and Handling: Coordinate delivery with scheduled installation date to minimize packaging, handling and storage time at site. Store materials in clean, dry location. Handle and store fuels to prevent spills and discharges into waterways. Store fuels, solvents and other sources of VOCs separately from absorbent materials. Implement proper disposal of waste materials.	
		Construction Site Housekeeping and Particulates Control: Control particulate discharge resulting from sandblasting operations. Use water sprinkling to control dust generation.	
		Environmental Manager: Designate an on-site party responsible for overseeing the environmental goals for the project.	
		Environmental Training Program: Provide environmental training for personnel performing work on the project site.	
MR 2.4 Construction Practices: Utility & Emissions Control	Reduce air & noise pollution from vehicle and construction equipment use during construction. Manage temp utilities efficiently.	Develop plan to reduce utility, vehicle and energy use, including: efficient lighting, controlled water use and runoff, high efficiency heating & cooling, weathertight enclosures, alternate fuel fleets, low-sulfur diesel, biodiesel or natural gas powered equipment, electric power equipment and carpooling. Reduce equipment related noise by complying with Blue Angel Criteria RAL-UZ-53 as consistent with performance requirements.	New
MR 3 Resource Reuse	Reuse building materials to reduce demand for virgin materials and to reduce waste.	Credit 3.1 Specify salvaged, refurbished or reused materials, products and furnishings for a minimum of 5% of the total value of all building materials and products used in the project.	LEED
		Credit 3.2 Specify at least another 5% (total 10% or greater) of the total value of all building materials and products used in the project.	

Title	Intent	Credit Goals	Source
MR 4 Recycled Content	Increase demand for building products that use recycled content materials, reducing impacts from extraction and processing of virgin materials.	Credit 4.1 Specify materials with recycled content such that the sum of post-consumer recycled content plus 1/2 the post-industrial recycled content constitutes at least 10% of the total monetary value of the materials in the project. No fly ash or slag from plant co-fired with hazardous or medical waste or tire derived fuel. Credit 4.2 Specify an additional 10% (total 20% or greater) of the total monetary value of the materials in the project.	Mod
MR 5 Regional Materials	Increase demand for building materials and products that are extracted and manufactured within the region.	Credit 5.1 Specify a minimum of 10% (by cost) of building materials that are extracted, harvested or recovered, then processed and manufactured within a radius of 300 miles, OR that are extracted, harvested or recovered, then, processed, manufactured and shipped primarily by rail or water within a radius of 1,000 miles OR combination. Credit 5.2 Specify an additional 10% (total 20%)	Mod
MR 6 Rapidly Renewable Materials	Reduce the depletion of finite raw materials and long-cycle renewable materials.	Specify rapidly renewable building materials and products (planted and harvested within a ten-year cycle) for a minimum of 5% of the total value of all building materials and products used in the project.	LEED
MR 7 Certified Wood	Encourage environmentally responsible forest management.	Specify products certified in accordance with the Forest Stewardship Council's Principles and Criteria for a minimum of 50% of the total value of all wood-based materials and products used in the project.	LEED
MR 8.1 PBT Elimination: Dioxins	Reduce the release of persistent bioaccumulative toxic chemicals (PBTs) associated with the life cycle of building materials.	No use of cement from kilns fired with hazardous waste AND no use of materials containing virgin or recycled chlorinated compounds (including CPE, CPVC, CSPE, neoprene, & PVC) in 2 of 3 areas (Exterior and Structural, Interior Finishes, Mechanical/Electrical Systems).	New
MR 8.2 PBT Elimination: Mercury		Specify HVAC systems, control systems, and other large electrical products and/or systems that are free of mercury switches and mercury relays.	New
MR 8.3 PBT Elimination: Lead & Cadmium		Specify substitutes for materials manufactured with lead and cadmium: Lead free solder, roofing and wiring. No use of paints containing cadmium or lead.	New
MR 9.1 Furniture & Medical Furnishings: Resource Reuse	Reduce the environmental impacts from the manufacture, use and disposal of furniture and medical furnishings products.	Specify salvaged, refurbished, or used furniture and medical furnishings for a minimum of 20% of the total furniture and medical furnishings budget.	New
MR 9.2 Furniture & Medical Furnishings: Materials		Specify 40% by cost of furniture and medical furnishings that comply with at least 2 of: - No PBTs in manufacture - Dioxin, Mercury, Cadmium, Lead or chlorinated compounds in furniture components, textiles, finishes or dyes. - No chrome plated finish. - FSC Certified Wood components in manufacture (per MR Credit 7).	
MR 9.3 Furniture & Medical Furnishings: Manufacturing, Transportation & Recycling		Specify 40% (by cost) of furniture and medical furnishings that comply with a minimum of two (2) of the following goals - Locally and/or regionally assembled – within 300 miles, if transported by truck and with 1000 miles if transported by rail or water. - Transported with minimum packaging – reusable, compostable or recyclable. - Has “end of life” destination – is designed for disassembly, recyclability, biodegradability, or is part of a “take back” program.	
MR 10 Copper Reduction	Prevent copper-contaminated run-off to aquatic systems.	Eliminate the use of copper roofing, gutters & cladding materials AND Specify and use ASTM B8133 flux and ASTM B828 joint technique when installing copper pipe to reduce copper pipe corrosion.	New
MR 11.1 Resource Use: Design for Flexibility	Conserve resources associated with the construction and management of buildings by designing for flexibility and ease of future adaptation, and minimizing initial resource use.	Increase building flexibility and ease of adaptive reuse over the life of the structure by employing one (1) or more of the following design and/or space planning strategies such as: modular planning grids, use of interstitial spaces, development of flexible “technology floors” for diagnostic and treatment facilities to facilitate ease of modifications for changing major equipment	New
MR 11.2 Resource Use: Minimize Materials		Minimize raw material usage of the structure over its life cycle by one or both of: demountable and modular building systems or components for partitions, raised floor distribution systems, or the like, comprising a minimum of 5% of the total value of the building component. In the case of modular casework, such casework must comprise 50% of the total combined value of casework and custom millwork, OR Demonstrate construction systems and/or strategies that require less material by utilizing shell elements as finish materials where appropriate (such as exposed ceilings, polished concrete floors, or exposed structure), that reduce total material usage by 5%	New

Environmental Quality

<i>Title</i>	<i>Intent</i>	<i>Credit Goals</i>	<i>Source</i>
EQ Prereq 1 Minimum IAQ Performance	Establish minimum IAQ performance to prevent the development of indoor air quality problems.	Meet the minimum requirements of voluntary consensus standard ASHRAE 62-2001, Ventilation for Acceptable Indoor Air Quality, and Addenda. Mechanical systems shall be designed using the Ventilation Rate Procedure.	LEED
EQ Prereq 2 Asbestos Removal or Encapsulation	Reduce the potential exposure of building occupants to asbestos.	Comply with EPA's asbestos removal, encapsulation and management regulations under NESHAP 40 CFR 61. Remove potentially friable materials in ventilation distribution plenums and chases per OSHA 29 CFR Part 1926. Identify all asbestos containing materials that may be affected by proposed construction activities.	New
EQ 1 Air Quality Monitoring	Provide capacity for indoor air quality (IAQ) monitoring to help sustain long-term occupant comfort and well-being.	For density ≥ 25 people per 1000sf, provide CO ₂ sensor and compare with outdoor ambient CO ₂ and generate alarm for 15% above ASHRAE Standard 62 concentrations. For other spaces monitor, control and alarm to maintain outdoor airflow within 15% of design minimum.	Mod
EQ 2 Increase Ventilation Effectiveness	Provide for the effective delivery and mixing of fresh air to support the safety, comfort and well-being of building occupants.	For mechanically ventilated buildings, design ventilation systems that result in an air change effectiveness (Eac) ≥ 0.9 as determined by ASHRAE 129-1997. For naturally ventilated spaces demonstrate a distribution and laminar flow pattern that involves $\geq 90\%$ of the room or zone area in flow direction. Up to 25% of total building area may be excluded where a) air distribution design is mandated and/or restricted by code or in b) unoccupied spaces (such as storage and mechanical areas) or in c) spaces with no supply distribution.	Mod
EQ 3.1 Construction IAQ Management Plan: During Construction	Prevent indoor air quality problems resulting from the construction or renovation process to sustain the comfort and well-being of construction workers and building occupants.	Develop and implement an Indoor Air Quality (IAQ) Management Plan for the construction and pre-occupancy phases of the building: - In occupied buildings, seal the construction site with deck-to-deck partitions and maintain negative pressure throughout the entire construction process. Contain and exhaust construction process odors to protect occupied areas. - Use filtration media with a MERV of 8 at each return air grill. Replace all filtration media immediately prior to occupancy. - Meet or exceed the recommended Design Approaches of the SMACNA IAQ Guideline for Occupied Buildings Under Construction, 1995, Chapters 3 & 4. - Manage the site in conjunction with the Infection Control Risk Assessment (ICRA) procedures from JCAHO Environment of Care Standard (EC.3.2.1). Protect absorptive materials from moisture damage while they are stored on-site and after they are installed. Immediately remove, dispose of and replace any materials with stains, mold, mildew or other evidence of water damage & replace with new, undamaged materials. - Sequence construction procedures to avoid exposing absorbent materials to VOCs from wet application materials. - Use IPM. Control dust, paint fumes, tobacco smoke and noise.	Mod
EQ 3.2 Construction IAQ Management Plan: Before Occupancy	Reduce indoor air quality problems resulting from the construction or renovation process to sustain the comfort and well-being of construction workers and building occupants.	Develop and implement an Indoor Air Quality (IAQ) Management Plan for the pre-occupancy phase of the building as follows: After construction ends and prior to occupancy conduct a minimum two week building flush-out with new filtration media at 100% outside air. After the flushout, replace the filtration media with new filtration media OR After construction ends and prior to occupancy conduct a baseline indoor air quality testing procedure that demonstrates that the concentration levels for the chemical contaminants listed are not exceeded.	Mod
EQ 4.1 Low-Emitting Materials: Interior Adhesives & Sealants	Reduce the quantity of indoor air contaminants that are odorous, potentially irritating and/or harmful to the comfort and well-being of installers and occupants.	Use only adhesives and sealants with volatile organic compound (VOC) content that does not exceed South Coast Air Quality Management District (SCAQMD) Rule #1168 and Bay Area Air Quality Management District (BAQMD) Regulation 8, Rule 51, except for flat sealants which must not exceed 50 grams/liter (SCAQMD 2008 level) and aerosol adhesives which must meet Green Seal Standard GC-36 requirements. Use only adhesives and sealants with no California Prop 65 carcinogen or reproductive toxicant components present at more than 1% of total mass.	Mod

Title	Intent	Credit Goals	Source
EQ 4.2 Low-Emitting Materials: Wall & Ceiling Finishes		Use only paints and coatings that comply with the most current version of the following standards: Green Seal Standard GS-11, Paints; Green Seal Standard GS-03, Anti-Corrosive Paints; South Coast Air Quality Management District (SCAQMD) Rule 1113, Architectural Coatings, rules in effect for 1/1/2008; Bay Area Air Quality Management District (BAQMD) Regulation 8, Rule 3 When ceiling tiles and or wall coverings are used instead of paint, use only products that meet or exceed the indoor air quality requirements of California's Special Environmental Requirements, Specifications Section 01350, OR are certified by SCS or GreenGuard.	Mod
EQ 4.3 Low-Emitting Materials: Flooring Systems		Use only carpet and resilient flooring systems that meet or exceed the indoor air quality requirements of California's Special Environmental Requirements, Specifications Section 01350 OR The Carpet and Rug Institute (CRI) "Green Label Plus". Use only adhesives and sealants with no California Prop 65 carcinogen or reproductive toxicant components present at more than 1% of total mass of the product. Use only carpets with no natural rubber latex in the backing.	Mod
EQ 4.4 Low-Emitting Materials: Composite Wood and Insulation		Use composite wood, casework, fiberglass insulation and agrifiber products and adhesives used to fabricate laminated in field- and shop-fabricated assemblies containing these products with no added urea-formaldehyde resins.	Mod
EQ 4.5 Low-Emitting Materials: Furniture & Medical Furnishings	Reduce the use of furniture that may release indoor air contaminants that are odorous or potentially irritating and may be deleterious to installer and occupant health, comfort and well-being.	Select a minimum of 40% (by cost) of all furniture and medical furnishings (including mattresses, foams, panel fabrics and other textiles) that do not contain at least three of the following four materials: Polybrominated diphenyl ethers (PBDE), perfluorooctanoic acid (PFOA), urea formaldehyde, phthalate plasticizers; OR that do not contain at least two of the four listed materials and either: meet or exceed the indoor air quality requirements of California's Special Environmental Requirements, Specifications Section 01350, OR are certified by SCS or GreenGuard.	New
EQ 4.6 Low-Emitting Materials: Exterior Applied Products	Protect installers and building occupants and safeguard air quality resulting from exposure to hazardous and/or odorous substances used during construction.	Specify and use coatings, roofing and waterproofing materials that meet or are lower than the VOC limits of Bay Area Air Quality Management District Regulation 8, Rule 51 & Rule 3. Contain from occupied areas or eliminate through material selection, odors, and other emissions produced by outdoor construction processes (i.e., bituminous roofing and waterproofing). Comply with NIOSH Publication No. 2003-112: Asphalt Fume Exposures During the Application of Hot Asphalt to Roofs.	New
EQ 5.1 Chemical & Pollutant Source Control: Outdoor	Avoid exposure of building occupants to potentially hazardous outdoor soils and pollutants that adversely impact air quality and human health.	Design to minimize pollutant contamination of regularly occupied areas due to exterior factors with: textured paving for outside approaches, permanent entryway systems (grilles, grates, etc.) at all high volume entryways and removable entryway systems at all entrances with associated cleaning, maintenance and replacement strategies. Locate all HVAC equipment air intakes a minimum distance from the following sources and a minimum of 10 feet above finish grade: - minimum of 100' from helipads and 50' from loading docks, ambulance bays, and entrances where vehicles are arriving or leaving (and prohibit idling in these locations), from designated smoking areas, from vegetation/ landscape subject to pesticide/herbicide applications and from other potential sources of air contaminants.	Mod
EQ 5.2 Chemical & Pollutant Source Control: Indoor	Avoid exposure of building occupants to potentially hazardous indoor pollutants and chemicals that adversely impact air quality and human health.	Design to minimize pollutant cross-contamination of regularly occupied spaces: Where chemical use occurs (including soiled utility areas, sterilization areas, housekeeping areas and copier areas), provide segregated areas with deck to deck partitions with separate outside exhaust at a rate of at least 0.50 CFM per square foot, (for rooms containing disinfectant and sterilant applications, a minimum of 12 air changes/hour shall be provided), no air re-circulation and maintain a negative pressure compared with the surrounding spaces of at least an average of 5 Pa (0.02 inches of water gauge) and with a minimum of 1 Pa (0.004 inches of water) when the door(s) to the room(s) are closed. Provide regularly occupied areas of the building with new air filtration media prior to occupancy that provides a Minimum Efficiency Reporting Value (MERV) of 13 or better.	New

Title	Intent	Credit Goals	Source
EQ 6.1 Controllability of Systems: Lighting	Provide a high level of temperature and ventilation or lighting system control by individual occupants, or by specific groups in multi-occupant spaces.	Provide individual lighting controls for 90% of the building occupants. Automatic daylight dimming controls must be provided for permanently installed lighting that is 15 feet inside of and 2 feet to either side of all windows and 10 feet around skylights and 10 feet from the exterior face of clerestories.	Mod
EQ 6.2 Controllability of Systems: Thermal & Ventilation		Provide individual temperature and ventilation controls for 50% of the occupants. Operable windows can be used in lieu of individual controls for areas that are 20 feet inside of and 10 feet to either side of the operable part of the window. Areas of operable window must meet ASHRAE 62-2001, ¶5.1.	Mod
EQ 7 Continuous Thermal Monitoring System	Provide a thermally comfortable environment that supports the productivity and well-being of building occupants.	Provide a permanent monitoring system and process for corrective action to ensure thermal comfort criteria to comply with ASHRAE Standard 55-2004, Thermal Comfort Conditions for Human Occupancy.	Mod
EQ 8.1 (5 points) Daylight & Views: Daylight for Occupied Spaces	Provide building occupants with a connection between indoor spaces and the outdoors by introducing daylight and views.	Design for 34-66% of total floor area within 15 ft of perimeter window or 2% daylight factor. (1-3 points) Inpatient Units: - Provide daylight access for 90% of patient and public spaces. (1 point) - Achieve 2% daylight factor for 75% of staff occupied areas. (1 point)	Mod
EQ 8.2 Daylight and Views: Building Orientation	Connect patients, visitors, and staff to the natural environment.	Assess the site and surrounding area and develop a master plan for incorporating ways of experiencing significant natural features (on-site and distant) into the overall site and building planning. Incorporate nature as an essential element of the building design in order to enhance the healing process.	Mod
EQ 8.3 Daylight and Views: Views from Occupied Spaces	Provide building occupants with a connection between indoor spaces and the outdoors by introducing daylight and views into the building's regularly occupied areas.	Establish direct line of sight to vision glazing for building occupants in 90% of all staff occupied areas including offices, corridors, nursing stations, break rooms, cafeterias, and lobbies. Areas directly connected to perimeter windows must have a glazing-to-floor area ratio of at least 0.07. Parts of the floor area with horizontal view angles of less than 10 degrees at 50 inches above the floor cannot be included in this calculation. End of corridor windows fulfill the requirement for unobstructed length of the corridor. Spaces not directly connected to perimeter windows must have a horizontal view angle of less than 10 degrees at 50 inches above the floor involving 50% or more of the room area. If the room meets these requirements then the entire room area is considered to meet the view goal. Exceptions to the goals include diagnostic and treatment rooms (if controlled environment prohibits introduction of natural light), copy rooms, storage areas, utility rooms, mechanical, and laundry rooms.	Mod
EQ 8.4 Daylight & Views: Lighting and Circadian Rhythm	Improve alertness levels, work performance, staff satisfaction and health, and reduce medical errors, by providing lighting systems based on circadian rhythm.	Provide electric lighting systems and controls for patient areas and staff work areas based upon principles of circadian rhythm. In patient areas, provide lighting design solutions that allow for variation in day and night lighting characteristics. In staff areas, provide lighting to support work performance and alertness through both daytime and night lighting cycles. Implement a no-rotation work routine to be able to address the needs of the day and the night shift appropriately. Provide ambient and task lighting that is variable spectrum, and free of glare, and task oriented. Where daylight is not achievable, provide electric lighting systems that simulate daylight, brightness and diurnal variation, and allow individual and central lighting control systems. Circadian Rhythm is a self-sustained biological rhythm that in an organism's natural environment normally has the period of approximately 24 hours.	New
EQ 9 Acoustic Environment	Provide building occupants with a healing environment, free of disruptive levels of sound and vibration.	Specify materials, products, mechanical systems and design features to attenuate sound and vibration, and not to exceed Room Criteria (RC) ratings listed for Hospital and Clinics in Table 34 of Chapter 46, Sound and Vibration Control, 1999 ASHRAE Application Handbook. Select ceiling tiles with NRC>0.85 and CAC≥35 Test Sound Levels as a component of Building Commissioning.	New

Innovation in Design

Title	Intent	Credit Goals	Source
IN 1 Innovation in Design	To provide project teams the opportunity to achieve points for exceptional performance above credit goals set by the <i>Green Guide for Health Care: Construction</i> and/or for innovation for green design goals and strategies not specifically addressed by the <i>Green Guide for Health Care</i> .	Identify the intent of the proposed innovation credit, the proposed credit goals, proposed documentation to demonstrate achievement, and the design approach used to meet the goals.	LEED-NC MOD

Operations

Integrated Operations

<i>Title</i>	<i>Intent</i>	<i>Credit Goals</i>	<i>Source</i>
IO Prereq 1 Integrated Operations & Maintenance Process	Demonstrate a cross discipline approach in Operations and Maintenance decision-making and implementation to ensure safe, healthful, environmentally sensitive methods and materials.	Demonstrate functional cross discipline process for decision-making regarding safe, healthful and environmentally sensitive operations and maintenance and encouraging continuous improvement.	New
IO Prereq 2 Recertification Process	Maintain the ongoing functional application of all design decisions & processes associated with the initial design certification.	Specify processes to monitor and document actual performance of each measure achieved in the initial design.	New
IO Prereq 3 Environmental Tobacco Smoke Control	Prevent exposure of building occupants and systems to Environmental Tobacco Smoke (ETS).	Prohibit smoking in the building. Locate any exterior designated smoking areas at least 50 feet away from entries, operable windows, air intakes, bus stops, disabled parking, and other locations where occupants could inadvertently come in contact with ETS when occupying, entering or leaving the building. Only for residential facilities where the functional program requires accommodation for smokers may there be an exception to establish negative pressure smoking rooms.	LEED-NC
IO Prereq 4 Outside Air Introduction & Exhaust Systems	Establish minimum indoor air quality (IAQ) performance to enhance indoor air quality in buildings, thus contributing to the health and well-being of the occupants.	Modify or maintain existing building outside-air (OA) ventilation distribution system to supply at least the outdoor air ventilation rate required by ASHRAE 62.1-2004. (ASHRAE 62.1.1-2001 with all Addenda can be used until ASHRAE 62.1-2004 is published.) Meet the EPA IAQ guidelines OR SMACNA IAQ guidelines for HVAC System Maintenance to ensure the proper operations and maintenance of HVAC components as they relate to IAQ. Test and maintain the operation of all building exhaust systems, including bathroom, utility areas, laboratories, kitchen and parking exhaust system.	MOD
IO 1.1 Building Operations & Maintenance: Staff Education	Support appropriate operations and maintenance of buildings and building systems to ensure they deliver target building performance goals over the life of the building.	Have in place over the performance period a building operations and maintenance staff education program that provides each staff person primarily working on building maintenance with at least 24 hours of education each year over the performance period on building and building systems operations, maintenance, and achieving sustainable building performance. Training must be of high quality and relevant to building operations and maintenance.	LEED-EB
IO 1.2 Building Systems Maintenance		Have in place over the performance period a comprehensive best practices equipment preventative maintenance program that provides in-house resources or contractual services to deliver post warranty maintenance.	LEED-EB
IO 1.3 Building Systems Monitoring		Have in place over the performance period a system for continuous tracking and optimization of systems that regulate indoor comfort and the conditions (temperature, humidity, and CO ₂) delivered in occupied spaces.	LEED-EB
IO 2.1 IAQ Management: Maintaining IAQ Performance	Enhance Indoor Air Quality (IAQ) performance by optimizing practices to prevent the development of indoor-air quality problems in buildings.	Establish an IAQ Compliance Program, as outlined in "A Guide to Managing Indoor Air Quality in Health Care Organizations", Joint Commission on Accreditation of Healthcare Organizations, 1997. OR Develop and implement on an ongoing basis an IAQ management program for your building based on the USEPA document "Building Air Quality: A Guide for Building Owners and Facility Managers".	Mod
IO 2.2 Reduce Particulates in Air Distribution	Reduce exposure of building occupants and maintenance personnel to potentially hazardous particulate contaminants.	Have filters with particle removal effectiveness MERV 13 or greater in place over the performance period for all outside air intakes and for the returns for the re-circulation of inside air. Establish and follow a regular schedule for maintenance and replacement of these filters.	LEED-EB

Transportation Operations

<i>Title</i>	<i>Intent</i>	<i>Credit Goals</i>	<i>Source</i>
TO 1.1 Alternative Transportation: Public Transportation Access	Reduce pollution and land development impacts from single occupancy vehicle use.	Provide and maintain a building occupant conveyance program (shuttle-link) for buildings that are more than 1/2 mile from commuter rail or subway and 1/4 mile from established bus routes.	LEED-NC
TO 1.2 Alternative Transportation: Low Emitting and Fuel Efficient Vehicles		Own or lease an alternative fuel vehicle fleet, using any combination of the acceptable fuel types, and comprising a minimum of 50% of total fleet mileage driven annually. Provide fueling stations for 100% of alternative fuel fleet, and preferred parking for such fleets, as applicable. Acceptable fuel types include bio-diesel, low-sulfur diesel, hydrogen, compressed natural gas, hybrid or all-electric.	New
TO 1.3 Alternative Transportation: Carpool Programs		Provide and maintain a building occupant carpooling program that serves a minimum of 5% of the full time equivalent (FTE) peak period staff and add no new parking. Provide preferred parking for carpool participants.	New

Energy Efficiency

<i>Title</i>	<i>Intent</i>	<i>Credit Goals</i>	<i>Source</i>
EE Prereq 1 Existing Building Commissioning	Verify that fundamental building systems and assemblies are performing as intended to meet current needs and sustainability requirements.	Verify and ensure that fundamental building elements and systems are installed, calibrated, and operating as intended so they can deliver functional and efficient performance. Carry out a comprehensive existing building commissioning including the following procedures: Develop a comprehensive building operation plan that meets the requirements of current building usage, and addresses the: heating system, cooling system, humidity control system, lighting system, safety systems and the building automation controls. Prepare a commissioning plan for carrying out the testing of all building systems to verify that they are working according to the specifications of the building operation plan. Implement the commissioning plan documenting all the results. Repair or upgrade all systems components that are found to not be working according to the specifications of the building operation plan. Re-test all building components that required repairs or upgrades to verify that they are working according to the specifications of the building operation plan.	LEED-EB
EE Prereq 2 Minimum Energy Performance	Establish the minimum level of energy performance for the building and systems.	Demonstrate that the building has achieved an EPA ENERGY STAR® score of at least 60 utilizing the EPA ENERGY STAR Benchmarking Tool for building types addressed by ENERGY STAR.	LEED-EB
EE Prereq 3 Ozone Protection	Reduce ozone depletion.	Zero use of CFC-based refrigerants in HVAC&R base building systems unless a third party audit shows that system replacement or conversion is not economically feasible.	LEED-EB
EE 1 Optimize Energy Performance	To achieve increasing levels of energy performance to reduce environmental impacts associated with excessive energy use.	Demonstrate ongoing continuous improvement in energy performance above the Energy Star score of 60, as required in Prerequisite 1, for the institution, campus or building as follows:	LEED-EB
		Credit 1.1 Energy Star score of 63	
		Credit 1.2 Energy Star score of 67	
		Credit 1.3 Energy Star score of 71	
		Credit 1.4 Energy Star score of 75	
		Credit 1.5 Energy Star score of 79	
		Credit 1.6 Energy Star score of 83	
		Credit 1.7 Energy Star score of 87	
		Credit 1.8 Energy Star score of 91	
		Credit 1.9 Energy Star score of 95	
Credit 1.10 Energy Star score of 99			
EE 2 On-Site and Off-Site Renewable Energy	Encourage and recognize increasing levels of on-site and off-site renewable energy in order to reduce environmental and health burdens associated with fossil fuel energy use.	Over the performance period, fulfill some or all of the building's total energy use through the use of on-site or off-site renewable energy systems. Points are earned according to the following table. The percentages shown are the percentage of building energy use over the performance period met by renewable energy resources.	LEED-EB
		1% on site generation or 5% off site Renewable Energy Certificates	
		2% on site generation or 10% off site Renewable Energy Certificates	
		5% on site generation or 25% off site Renewable Energy Certificates	
10% on site generation or 50% off site Renewable Energy Certificates			
EE 3 Energy Efficient Equipment	Reduce energy consumption by using efficient medical and other equipment.	Obtain and install a minimum 75%, based on cost, of the annual electrical medical and office equipment, that is either Energy Star® qualified, or in the top 25th percentile for energy consumption for that class of equipment.	New

Title	Intent	Credit Goals	Source
EE 4 Refrigerant Selection	Reduce ozone depletion and support early compliance with the Montreal Protocol.	Do not operate base building HVAC, refrigeration or fire suppression systems that contain HCFCs or Halons. OR Reduce emissions of refrigerants from base cooling equipment to less than 3% of charge per year over the performance period using EPA Clean Air Act, Title VI, Rule 608 procedures governing refrigerant management and reporting and reduce the leakage over the remainder of unit life to below 25%.	LEED-EB
EE 5.1 Performance Measurement: Enhanced Metering	Demonstrate ongoing accountability and optimization of building energy and water consumption performance over time and add incentives for additional energy reduction.	Have in place over the performance period continuous metering for the following items: (Up to 2 points can be earned - one point is earned for each 4 actions implemented/maintained). For each item metered, prepare, implement and maintain a program for using the data gathered to improve building performance over time. - Lighting systems and controls. - Separate building electric meters that allow aggregation of all process electric loads. - Separate building natural gas meters that allow aggregation of all process natural gas loads. - Chilled water system efficiency at variable loads (kW/ton) or cooling loads (for non-chilled water systems). - Cooling load. - Air and water economizer and heat recovery cycle operation. - Boiler efficiencies. - Building specific process energy systems and equipment efficiency. - Constant and variable motor loads. - Variable frequency drive (VFD) operation. - Air distribution, static pressure and ventilation air volumes.	LEED-EB MOD
EE 5.2 Performance Measurement: Emission Reduction Reporting	Reduce building energy use and associated emissions.	Identify building performance parameters that reduce energy use and reduce emissions. - Track and record the significant emission reductions including those delivered by energy efficiency, renewable energy and other building emission reduction actions including: carbon dioxide (CO ₂), sulfur dioxide (SO ₂), nitrogen oxides (NO _x), mercury (Hg), small particulates (PM _{2.5}), large particulates (PM ₁₀), and volatile organic compounds (VOCs). - Report the reductions in emissions resulting from these energy efficiency and renewable operations using a third party voluntary certification program. - Retire at least 10% of the emission reductions, delivered by the energy efficiency actions, through a third party voluntary certification program. - Ask the suppliers of goods and services for the building to do the same by implementing actions above.	LEED-EB

Water Conservation

Title	Intent	Credit Goals	Source
WC Prereq 1 Minimum Water Efficiency	Maximize fixture water efficiency within buildings to reduce the burden on potable water supply and wastewater systems.	Maximize fixture potable water efficiency to achieve a level equal to or below water use baseline, calculated as 120 percent of the water usage that would result if 100% of the total building fixture count were outfitted with plumbing fixtures that meet the Energy Policy Act of 1992 fixture performance requirements. If the building does not have separate metering for each water use (fixture use, process use, irrigation and other uses) the water use reduction achievements can be demonstrated with calculations. At least one meter for the overall building water use is required and metering for cooling towers and other process water uses are encouraged but not required.	LEED-EB
WC 1 Water Use Reduction: Water Efficient Landscaping	Limit or eliminate the use of potable water for landscaping irrigation.	Use high-efficiency irrigation technology OR use captured rain or recycled site water to reduce potable water consumption for irrigation in comparison to conventional means of irrigation. Achieve reductions in potable water use for irrigation over conventional means of irrigation.	LEED
		Credit 1.1 Reduce potable water use by 50%.	
		Credit 1.2 Reduce potable water use by 100%.	
WC 2 Building Water Use Reduction	Maximize fixture water efficiency within buildings to reduce the burden on potable water supply and wastewater systems.	Have in place over the performance period strategies and systems that in aggregate produce a reduction of fixture potable water use from the calculated fixture water usage baseline established in WC Prerequisite 1. If the building does not have separate metering for each water use (fixture use, process use, irrigation and other uses) the water use reduction achievements can be demonstrated with calculations. At least one meter for the overall building water use is required and metering for cooling towers and other process water use is encouraged but not required.	LEED-EB
		Credit 2.1 Reduce potable water use by 10%.	
		Credit 2.2 Reduce potable water use by 20%.	
WC 3 Process Water Efficiency	Reduce process potable water use and process wastewater generation.	Process water is defined as water used for non-sanitary purposes. Examples of process water use in a health care facility include imaging equipment, microscopes, decontamination equipment, other diagnostic and lab equipment, dietary equipment and laundry facilities.	New
		Credit 3.1 Adopt technologies and strategies to reduce process water use and process wastewater generation by 20%. Document the reductions from baseline.	
		Credit 3.2 Adopt technologies and strategies to reduce process water use and process wastewater generation by 30%.	
		Credit 3.3 Adopt technologies and strategies to reduce process water use and process wastewater generation by 40%.	
WC 4 Water Use Reduction: Measurement	Provide for the ongoing optimization and conservation of building potable water consumption over time and in areas of the facility not otherwise impacted by construction.	Provide for long term continuous measurement of potable water uses within the facility. Provide individual meters for the following water uses (as applicable to the project): <ul style="list-style-type: none"> -Water use in laboratory -Water use in dietary department -Water use in central sterile and processing department -Water use in laundry -Water use in radiology and imaging department -Water use in Surgical Suite -Purified water system (reverse osmosis and/or de-ionized) and filter backwash water -Outdoor irrigation systems -Cooling tower make-up and filter backwash water -Steam boiler system make-up water -Closed loop hydronic system make-up water -Water use in mechanical equipment, including pumps 	LEED-EB MOD

Chemical Management

Title	Intent	Credit Goals	Source
CM Prereq 1 Polychlorinated BiPhenyl (PCB) Removal	Reduce the potential exposure of building occupants to PCBs and PCB combustion by-products in case of fire in the building.	Establish a PCB management program. Identify the applicable regulatory requirements. Have a current survey that identifies where PCBs are located in the building and on the site so that the PCBs present can be addressed appropriately in the ongoing PCB management program.	LEED-EB
CM 1.1 Community Contaminant Prevention: Airborne Releases	Minimize building airborne effluents and environmental, health and safety burdens to site and neighbors.	Exceed by 10% the NIH-CDC Guidelines for Airborne Effluent from Laboratories that Handle Biohazards (CDC-NIH Biosafety in Microbiological and Biomedical Laboratories, latest edition (currently May 1999)). Meet all standards of California South Coast Air Quality Management District for all products of combustion. Obtain low sulfur diesel or bio-diesel fuels for generators and other diesel equipment.	New (EPC)
CM 1.2 Community Contaminant Prevention: Leaks & Spills	Prevent releases of hazardous chemicals and fuels to storm sewer.	Develop and implement a policy to use containment and engineering controls to manage outdoor storage of fuels and chemicals in order to minimize risk from leakage and spills.	New (EPC)
CM 2 Indoor Pollutant Source Control: High Hazard Chemical Management	Avoid exposure of building occupants to potentially hazardous indoor pollutants and chemicals that adversely impact air quality and human health.	Develop a policy for receiving, handling, storing and disposing of high hazard substances. Include the purchasing department in developing standards for evaluating hazardous chemicals prior to purchase. Minimize the use of hazardous chemicals in specific applications (refer to Credit language for list)	New
CM 3.1 Chemical Discharge: Chemical Waste Minimization Plan	Protect natural habitat, waterways and water supply from pollutants carried by building discharge water.	Protect municipal sewage treatment works from pollutant discharge from building operations. Prepare a chemical waste minimization plan to minimize or eliminate chemical waste drainage to the sanitary system that includes: - A listing of chemical products and systems for the evaluation and implementation of less toxic alternatives. Priority areas include: Dialysis, Environmental Services, Facilities Management/Engineering, Laboratory/Pathology/Histology, Nutrition Services, Pharmacy, - Radiology, Sterile Processing, and Surgical Services. - A description of chemical storage areas and description and implementation of secondary containment.	New
CM 3.2 Chemical Discharge: Pharmaceutical Waste Minimization Plan	Reduce pharmaceutical wastes in sanitary sewer discharge.	Develop an integrated pharmaceutical waste management system in which all waste bulk chemotherapy items are segregated and managed as hazardous waste, all other waste pharmaceuticals are segregated into hazardous or non-hazardous waste, and no antibiotics, hormones or other pharmaceutical waste is drain disposed to the sanitary sewer system. Develop a pharmaceutical waste minimization plan that includes: - Non-hazardous pharmaceutical waste: Segregate into dedicated containers for disposal at a regulated landfill permitted to accept non-hazardous pharmaceutical waste; - Non-chemotherapy pharmaceutical waste that meets the definition of a hazardous waste: Identify, segregate, label, store, and manage as hazardous waste as defined in the Resource Conservation and Recovery Act (RCRA); - Bulk chemotherapy waste: Segregate from trace chemotherapy waste, label, store, and manage bulk chemotherapy waste as hazardous waste as defined in the RCRA.	New

Waste Management

<i>Title</i>	<i>Intent</i>	<i>Credit Goals</i>	<i>Source</i>
WM Prereq 1 Waste Stream Audit	Establish minimum source reduction and recycling program elements and quantify current waste stream production volume.	Conduct a waste stream audit of the ongoing waste stream to establish a current baseline identifying the types and amounts of waste stream constituents. At a minimum, the audit should determine the amounts for paper, glass, plastics, cardboard, regulated medical waste, hazardous waste and metals in the waste stream. Operate over the performance period a procurement/management policy to reduce waste stream through purchasing strategies, collection station equipment and occupant education.	LEED-EB
WM 1 Total Waste Reduction	Reduce solid waste disposal in landfills and incinerators generated by healthcare facilities through reduction, reuse, recycling and composting.	<p>Have in place over the performance period a Waste Management Plan and implementation strategies to prioritize reduction, reuse, recycling, and composting to divert wastes from disposal in landfills and incinerators.</p> <p>Incorporate steps into the facility's Waste Management Plan to eliminate, minimize, substitute and safely dispose of wastes generated by the facility using reduction of disposables and single use devices.</p> <p>Incorporate steps into the facility's Waste Management Plan that address the separation, collection and storage of materials for recycling, including (at a minimum) paper, glass, plastics, cardboard/OCC, metals, batteries and fluorescent lamps.</p> <p>The Plan should be designed to collect and recycle a minimum of 95% of batteries and a minimum of 95% of fluorescent lamps discarded.</p> <p>Each time reusable architectural elements, such as panels, are moved and reinstalled, they can be counted as part of the total waste stream and included in the recycled component of the waste stream.</p> <p>Incorporate steps into the facility's Waste Management Plan to implement best available technology (BAT) alternatives to incineration</p> <p>AND</p> <p>For existing health care facilities, reduce total waste below 1998 levels as indicated in the table which follows (by weight or volume):</p> <p>Credit 1.1 Reduce total waste volume by a minimum of 30%.</p> <p>Credit 1.2 Reduce total waste volume by a minimum of 40%.</p> <p>Credit 1.3 Reduce total waste volume by a minimum of 50%.</p>	LEED-EB MOD
WM 2 Regulated Medical Waste Reduction	Reduce solid waste disposal in landfills and incinerators generated by health care facilities through reduction, reuse, recycling and composting.	<p>Credit 2.1 Demonstrate that total regulated medical waste volume or weight is less than 10% of the solid waste stream from the facility.</p> <p>Credit 2.2 Demonstrate that incineration will be used to dispose of only that fraction of the waste stream required by regulations to be incinerated. (Pyrolysis is not considered an acceptable alternative to incineration.)</p>	New
WM 3 Food Waste Reduction	Reduce solid waste disposal in landfills and incinerators generated by health care facilities through reduction, reuse, recycling and composting.	<p>Develop a food waste diversion and collection plan, consistent with health and solid waste regulations, for all food use areas including but not limited to: catering, patient rooms, cafeteria and food preparation areas.</p> <p>Divert a minimum of 75% of food service organic waste by weight from the solid waste stream. Diversion may include any combination of animal feed, compost or donation. Provide controlled areas to facilitate easy removal of food waste, consistent with facility Integrated Pest Management (IPM) plan.</p>	New

Environmental Services

<i>Title</i>	<i>Intent</i>	<i>Credit Goals</i>	<i>Source</i>
ES 1 Outdoor Grounds and Building Exterior Management	Encourage grounds/site/building exterior management practices that preserve ecological integrity, enhance biodiversity and protect wildlife while protecting the health of building occupants.	Have in place over the performance period a low-impact site and green building exterior management plan that addresses the topics listed below. One point is earned for each four items addressed: <ul style="list-style-type: none"> - Maintenance equipment - Plantings - Animal and vegetation pest control - Landscape waste - Fertilizer use - Snow removal (where applicable) - Cleaning of building exterior - Paints and sealants used on building exterior - Other maintenance of the building exterior 	LEED-EB
ES 2 Indoor Integrated Pest Management	Reduce human exposure to physical and chemical hazards and odors associated with pest management products and practices by employing custodial operations that use safe methods and low-toxicity or non-toxic pest management products.	Develop and implement an Integrated Pest Management Program for managing pest control in the building interior, including, at a minimum: <ul style="list-style-type: none"> - Methods of identifying pests and monitoring levels of infestation. - Stated action thresholds, or the level of infestation that can be tolerated. - Listing of preventive or corrective actions to be employed (such as sanitation, structural repairs, and ongoing maintenance), traps, and the judicious use of pesticides. 	LEED-EB MOD
ES 3 Environmentally Preferable Cleaning Policy	Limit exposure of building occupants and maintenance personnel to potentially hazardous chemical, biological and particulate contaminants.	Develop and maintain an environmentally preferable cleaning policy for all surfaces, including floors, walls, furniture and medical equipment addressing: <ul style="list-style-type: none"> -Sustainable floor care systems. - Levels of required disinfection for all surfaces. - Sustainable cleaning systems. - Use of sustainable cleaning products. - Use of chemical concentrates and appropriate dilution systems. - Proper training of maintenance personnel in the hazards, use, maintenance and disposal of cleaning chemicals, dispensing equipment and packaging. - Use of hand soaps that do not contain antimicrobial agents (other than as a preservative system), except where required by health codes and other regulations (i.e., food service and health care requirements). - Use of cleaning equipment that does not negatively impact IAQ. 	LEED-EB MOD
ES 4.1 Sustainable Cleaning Products & Materials	Limit exposure of building occupants and maintenance personnel to potentially hazardous chemical, biological and particulate contaminants.	Adopt and implement sustainable purchasing policy for cleaning products and materials. Cleaning product and material purchases include building purchases for use by in-house staff or used by outsourced service providers. Calculate the percentage of the total sustainable material and product purchases that meet the specified sustainability criteria. One point will be awarded for each 30% of the total annual purchases of these products (on a cost basis) that meet the following sustainability criteria (up to 3 points): <ul style="list-style-type: none"> - Cleaning products that meet the Green Seal GS-37 standard if applicable, OR if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels. - Minimize added fragrances in cleaning products. 	LEED-EB MOD
ES 4.2 Environmentally Preferable Janitorial Equipment		Develop, implement and maintain a policy for the use of janitorial equipment that maximizes effective reduction of building contaminants while minimizing environmental and health burdens.	LEED-EB

Environmentally Preferable Purchasing

Title	Intent	Credit Goals	Source
<p>EP 1.1 Food: Organic or Sustainable</p> <p>EP 1.1 Food: Antibiotics</p>	<p>Support sustainable food production and improved environmental health through purchase of organic, drug free and locally produced food products.</p>	<p>Organic or Sustainable Food Procure at least 25% of combined food and beverage purchases from sources that are: - USDA certified organic - Food Alliance Certified - Rainforest Alliance Certified - Protected Harvest - Fair Trade Certified AND/OR - local farms within a 100 mile radius of the facility.</p> <p>Antibiotics in Meat Production Adopt a meat procurement purchasing policy that includes the following requirements. - Regularly and consistently inform suppliers of meat, poultry, dairy, and seafood products of the preference for purchasing products that have been produced without non-therapeutic use of antibiotics, particularly those that belong to classes of compounds approved for use in human medicine. Procure a minimum of 50% of the total volume of such purchasing in compliance with this requirement.</p>	<p>NEW</p>
<p>EP 1.2 Local Production / Food Security</p>		<p>Farmers Markets Host and promote on-site farmers market during growing season(s), OR Support and promote local farmers market during growing season(s), OR Farmers-Consumer Links Provide access and support of direct farmer-to-consumer link, such as Community Supported Agriculture and/or food box program to patients, with a priority on low income population, OR Farms and Gardens Support on-site food producing garden and/or urban food producing garden programs that are accessible to the public.</p>	
<p>EP 2 Janitorial Paper & other Disposable Products</p>	<p>Reduce use of virgin paper resources in janitorial and other disposable product applications.</p>	<p>Develop and maintain a low environmental impact disposable product policy, addressing the following: - Use disposable janitorial paper products and trash bags that meet the most current Comprehensive Procurement Guidelines (CPG) for recycled content, AND - Give preference to paper products that are manufactured Process Chlorine-Free, AND - Use large rolls wherever possible, and hands-free dispensers that limit paper portions, AND - Do not use C-fold or multi-fold paper towel systems.</p>	<p>New</p>

Credit Summary: Operations
Environmentally Preferable
Purchasing

Title	Intent	Credit Goals	Source
EP 3 Electronics Purchasing and Take Back	Require take back and management services for end-of-life electronic products to safely manage hazardous compounds.	Develop IT Assets Management Team that has staff from IT, Environmental Services/ Recycling, Procurement, Administration and Risk Officers. Develop an IT-Environmental Management Plan. The IT-Environmental Management Plan should include strategies around Procurement, Reduction, responsible reuse, and responsible recycling. Each of these strategies should be in compliance with federal and state regulations and include: - Manufacturers' written commitments of equipment take-back at end of product life. - Only those recyclers that have signed the Recycler's Pledge of Environmental Stewardship, and verified that they do not export hazardous waste shall be contracted with. - The plan should comply with all state and federal hazardous waste regulations, including Universal Waste Rules. - A HIPAA compliance plan for electronic products.	NEW
EP 4.1 Toxic Reduction: Mercury	Eliminate stand-alone mercury-containing medical devices and reduce mercury discharge through product substitution and capture.	Develop a mercury free policy. Eliminate specification and use of barometers, medical devices, and other stand-alone mercury containing medical equipment. Purchase mercury free MRI equipment, wheel chairs, automated beds and other medical and laboratory equipment. Purchase low mercury fluorescent tubes and compact fluorescent lamps, and low mercury high intensity discharge bulbs such that average mercury content in fluorescent tubes and compact fluorescent lamps does not exceed 5 mg of mercury, and that high-intensity discharge lamps have the lowest available mercury content, providing that all other performance specifications are met. Collection and disposal of any mercury devices shall be designated for recycling and preclude overseas donation/disposal. Develop a mercury spill protocol, and hold recaptured mercury for safe disposal.	LEED-EB MOD
EP 4.2 Toxic Reduction: DEHP	To reduce and limit the exposure of patients, staff and visitors to DEHP from clinical products plasticized with DEHP.	DEHP is used extensively as a plasticizer in PVC containing products. Facilities shall develop a DEHP elimination plan. The plan shall require: - Audit and identify use areas of flexible PVC (or vinyl) plasticized with DEHP. Tubing, IV and blood bags are the primary end uses for disposable PVC medical products. - Develop a DEHP-free implementation plan, including timelines for phaseout for procedures identified by the FDA as high risk. - According to the FDA these highest risk procedures are total parenteral nutrition in neonates (with lipids in PVC bag), enteral nutrition in neonates and adults, multiple procedures in sick neonates (high cumulative exposure), hemodialysis in peripubertal males or pregnant or lactating women, exchange transfusion in neonates, heart transplantation or coronary artery bypass graft surgery (aggregate dose), massive infusion of blood into trauma patient, extracorporeal membrane oxygenation (ECMO) in neonates, transfusion in adults undergoing ECMO. - Directs the facility purchasing department and/or Group Purchasing Organization to require manufacturers to label DEHP containing products. - Include a purchasing policy which gives preference to DEHP-free clinical and other products.	NEW
EP 4.3 Toxic Reduction: Natural Rubber Latex	Eliminate air contaminants and allergens emitted from medical supplies and devices and that release volatile organic compounds and other chemicals to ensure the health of building occupants and staff.	Establish and implement a policy prohibiting the procurement and use of natural rubber latex surgical gloves, balloons, and other products and materials containing natural rubber latex in health care facilities. Establish and implement a policy prohibiting the procurement and use of natural rubber latex in carpet backing.	NEW

Credit Summary: Operations
Environmentally Preferable
Purchasing

<i>Title</i>	<i>Intent</i>	<i>Credit Goals</i>	<i>Source</i>
EP 5 Furniture and Medical Furnishings	Reduce the environmental impacts from the manufacture, use and disposal of furniture and medical furnishings products.	Purchase 40% of annual volume of furniture and medical furnishings that complies with the requirements of Construction: MR Credit 9.1-9.3 Furniture and Medical Furnishings.	LEED-EB MOD
EP 6 IAQ Compliant Products	Enhance building indoor air quality (IAQ) through procurement and implementation of low-emitting products and processes.	<p>Optimize use of air quality compliant materials inside the building to improve the building's emission profile. Points are awarded for the existence of sustainable product purchasing policies for the building and site addressing these requirements, and documentation of purchasing during the performance period in conformance with those policies, as described below. Subsequent re-certification is tied to both policies and purchasing performance, as described below.</p> <p>At a minimum, these policies must include the following product groups: paints and coatings, adhesives, sealants, carpet, composite panels, agrifiber products and building materials used inside the building. The building materials covered include any building materials used for improvements, including upgrades, retrofits, renovations or modifications, inside the building.</p> <p>One point shall be awarded, up to a maximum of 2 points, for each 45% of annual purchases calculated on a dollar value that conform with one of the following sustainability criteria:</p> <ul style="list-style-type: none"> - Adhesives and sealants with a VOC content that complies with Construction: EQ Credit 4.1 Credit Goals, OR - Paints and coatings with VOC emissions that do not exceed the VOC and chemical component limits of Green Seal's Standard GS-11 requirements and complies with Construction: EQ Credit 4.2 Credit Goals, OR - Carpet that meets the Credit Goals of Construction: EQ Credit 4.3, OR - Composite panels, agrifiber products and insulation that contain no added urea-formaldehyde resins and comply with Credit Goals of Construction: EQ Credit 4.4. 	LEED-EB

Innovation in Operations

Title	Intent	Credit Goals	Source
IN 1 Innovation in Operation	To provide project teams and projects the opportunity to achieve points for exceptional performance above requirements set by the <i>Green Guide for Health Care: Operations</i> and/or for innovation for green operations goals and strategies not specifically addressed by the <i>Green Guide for Health Care</i> .	Identify the intent of the proposed innovation credit, the proposed credit goals, the proposed documentation to demonstrate achievement, and the operations approach used to meet the goals.	LEED-EB MOD
IN 2 Documenting Sustainable Operations: Business Case Impacts	Document sustainable building cost impacts.	Document overall building operating costs for the previous five years (or length of building occupancy, if shorter), and track changes in overall building operating costs over the performance period. Document building operating cost and financial impacts of all of the aspects of <i>Green Guide</i> implementation on an ongoing basis.	LEED-EB
IN 3.1 Documenting Productivity Impacts: Absenteeism and Health Care Cost Impacts	Document absenteeism, health care cost and productivity impacts of sustainable building performance improvements.	Document the history of absenteeism and health care costs for building occupants for the previous five years (or length of building occupancy with a minimum of 12 months) and track changes in absenteeism and health care costs (claim costs must be provided and any reductions in premium costs should be provided if available) for building occupants over the performance period relative to sustainable building performance improvements.	LEED-EB
IN 3.2 Documenting Productivity Impacts: Other Productivity Impacts	Document other productivity impacts of sustainable building performance improvements.	Document other productivity impacts (beyond health impacts outlined in IN Credit 3.1) of sustainable building performance improvements for building occupants. Address and track changes in staff recruitment, satisfaction or retention, clinical performance measures (medical errors, for example) for building occupants over the performance period relative to sustainable building performance improvements, for a minimum of 12 months.	LEED-EB MOD

Construction Credits

Integrated Design

Required

ID Prerequisite 1
Integrated Design Process

Intent

Achieve an effective collaborative design process and outcome by engaging the multiple design disciplines, as well as owners, users, constructors, facility managers and operations personnel.

Health Issues

Integrated teams are necessary for successful application of green building solutions. The conventional construction of health care facilities, with its myriad technical requirements, is often fragmented and disjointed with members of the design team competing for limited construction funds. Participation of all members of the design team throughout the process will enable cross-discipline decision making relative to such issues as building siting, configuration, envelope and HVAC design.

Integration leads to perceiving the building as a set of interrelated and interdependent systems where a single design decision can trigger multiple systemic improvements. The purpose of this prerequisite is to encourage design teams to organize for success in implementing green building solutions. The merging of ideas, perspectives and areas of expertise facilitated by an open communications process reaps multiple benefits, as the project team moves from the optimization of single systems in isolation to the optimization of the entire building enterprise. Establishing vertical support throughout the organization helps ensure success.

Credit Goals

- Use cross discipline design and decision making starting early in the process & continuing throughout to take advantage of interrelationships between systems. Include representation early on in the design process from all end user stakeholders, including owners, physician teams, nursing, administrators, support services, housekeeping staff, and engineering/ maintenance personnel.

Documentation

- q Compile copies of the Goals Statements, performance checklists, and/or other design tools used in the development of the project's high performance design components.
- q Identify obstacles that were encountered that prevented the team from realizing the originally identified goals and/or performance targets.

Reference Standards

There is no reference standard for this credit.

ID Prerequisite 1 continued

Integrated Design

Potential Technologies & Strategies

Reinforce corporate/institutional commitments to environmental health and community responsibility. Use cross discipline design, decision-making, and charrettes. Use goal setting workshops and build a team approach. Prepare checklists for points and strategies prior to beginning the design process; refer to these at milestones during the design process.

Engage owner, staff, contractors, user groups and community groups, educating them on the benefits of green design and bringing them in to the design process at key points in the decision-making process.

Register your project and design team to participate in the GGHC Pilot at www.gghc.org to participate in peer-to-peer problem solving in the GGHC Forum with other teams also working to achieve sustainable design goals and objectives.

Required

ID Prerequisite 2

Environmental Health Mission Statement & Program

Intent

Establish environmental health goals and use as a basis for selection and implementation of building design, construction, and operational strategies.

Health Issues

Prevention is a fundamental principle of health care and public health. The health care industry acknowledges that prevention is preferable to treatment of disease after it has occurred. In the face of uncertainty, precautionary action is appropriate to prevent harm. This public health approach makes sense both in the clinical setting and in response to environmental and public health hazards. Similarly, a precautionary and preventive approach is an appropriate basis for decisions regarding health care building design and materials choices and activities.

Credit Goals

- Prepare an environmental health mission statement and program to complement the facility's functional design program. The environmental health program shall be retained by the facility with the other design data to assure that future alterations, additions, and program changes are consistent with the intent of the environmental health program.

Documentation

- c) Prepare a copy of the environmental health mission statement and program.

Reference Standards

There is no reference standard for this credit.

Potential Technologies and Strategies

Develop this document as an initial component of an integrated design charrette, to serve as a basis for decisions regarding sustainable design and operations. This environmental health program shall describe project design goals that minimize the potential adverse impacts of the project on the health of occupants, the local community, and the global environment while enhancing the healing environment for patients and the work environment for the staff. This shall be a guiding document for design team selection, design criteria development, and construction documents.

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Sustainable Sites

Required

SS Prerequisite 1

Erosion & Sedimentation Control

Intent

Control erosion to reduce negative impacts on water and air quality.

Health Issues

Controlling erosion and sedimentation retains soil resources on site, preventing contaminated run-off from entering aquatic bodies with potential for human exposure to waterborne pollutants and toxic chemicals, and dispersion of dust and particulate matter that can exacerbate respiratory illnesses.

Credit Goals

- Develop a site sediment and erosion control plan, specific to the site, that conforms to United States Environmental Protection Agency (EPA) Document No. EPA-832R-92-005 (September 1992), Stormwater Management for Construction Activities, Chapter 3, OR local erosion and sedimentation control standards and codes, whichever is more stringent. Assure that the plan meets the following objectives:
 - Prevent loss of soil during construction by stormwater run-off and/or wind erosion, including protecting topsoil by stockpiling for reuse.
 - Prevent sedimentation of storm sewer or receiving streams.
 - Prevent polluting the air with dust and particulate matter.

Documentation

- c) Prepare a Site Protection Plan and specifications, by civil engineer or responsible party, noting how the project follows local erosion and sedimentation control standards or the referenced EPA standard (whichever is more stringent) and identifying the limits of construction and disturbance and protection measures, including erosion control measures highlighted.

Reference Standards

United States Environmental Protection Agency (EPA) Document No. EPA-832R-92-005 (September 1992), Stormwater Management for Construction Activities, Chapter 3, www.epa.gov.

Potential Technologies & Strategies

Adopt an erosion and sedimentation control plan for the project site during construction. Consider employing strategies such as temporary and permanent seeding, mulching, earth dikes, silt fencing, sediment traps, and sediment basins. Other methods include protection of existing vegetation including protection of clusters or groupings of existing vegetation (i.e. tree or shrub masses) rather than isolated plant material in order to minimize unnecessary ground disturbance (topsoil stripping) and removal of existing groundcover.

1 point

SS Credit 1
Site Selection**Intent**

Avoid development of inappropriate sites and reduce the environmental impact from the location of a building on a site.

Health Issues

Sustainable site selection criteria contribute to healthy ecosystems – clean air and clean water – thereby enhancing the public health by protecting wetlands, agricultural lands and open spaces. Biodiversity protects ecosystems, water systems and endangered and threatened species.

Credit Goals

- Do not develop buildings, roads or parking areas on portions of sites that meet any one of the following criteria:
 - Prime farmland as defined by the United States Department of Agriculture in the United States Code of Federal Regulations, Title 7, Volume 6, Parts 400 to 699, Section 657.5 (citation 7CFR657.5).
 - Land whose elevation is lower than 5 feet above the elevation of the 100-year flood as defined by the Federal Emergency Management Agency (FEMA).
 - Land which is specifically identified as habitat for any species on the Federal or State threatened or endangered lists.
 - Within 100 feet of any water including wetlands as defined by United States Code of Federal Regulations 40 CFR, Parts 230-233 and Part 22, and isolated wetlands or areas of special concern identified by state or local rule, OR greater than distances given in state or local regulations as defined by local or state rule or law, whichever is more stringent.
 - Land which prior to acquisition for the project was public parkland, unless land of equal or greater value as parkland is accepted in trade by the public landowner (Park Authority projects exempt).

Documentation

- c) Obtain verification from the civil engineer that the project site meets the credit goals.

Reference Standards

American Farmland Trust Definition of Prime Agricultural Land, www.farmland.org.

Federal Emergency Management Agency (FEMA) 100-Year Flood Definition, www.fema.gov.

Regional Endangered Species Lists, <http://endangered.fws.gov>.

40 CFR, Parts 230-233, and Part 22. Code of Federal Register, <http://www.gpoaccess.gov/cfr/index.html>

Potential Technologies & Strategies

Give preference to sites that do not include sensitive site elements and restricted land types. Select a suitable building location and design the building with the minimal footprint to minimize site disruption. Strategies include stacking the building program, tuck under parking, and sharing facilities with neighbors.

1 point

SS Credit 2**Development Density****Intent**

Channel development to urban areas with existing infrastructures, protect greenfields and preserve habitat and natural resources. In rural areas, increase development density on existing or previously developed sites rather than undeveloped rural land.

Health Issues

Siting decisions for hospitals and related health care facilities reflect regional health care needs, often requiring a rural site selection to keep pace with development patterns. Locating new facilities where development exists minimizes sprawl and the resulting unhealthful air quality and sedentary lifestyle indicators associated with auto-dependence and transportation-related air pollution. Several studies show that increased sprawl correlates with obesity and high blood pressure.

Credit Goals

- Increase localized density to conform to governmental density goals by utilizing sites that are located within an existing minimum development density of 80,000 square feet per acre (two story downtown development)

OR

- For previously developed rural sites, increase density of the existing site to a minimum development density of 30,000 square feet per acre.

Documentation

- Prepare the calculation demonstrating that the project has achieved the required development densities. Obtain density calculations for the project site and for the surrounding area.
- Prepare an area plan with the project location highlighted.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

During the site selection process, give preference to urban sites with high development densities. Quantify the development density of the project as well as the surrounding area. For health care providers in rural areas, increase development density on previously developed sites rather than achieving expansion through acquisition of undeveloped rural land.

Resources

Urban Land Institute, [washington.uli.org](http://www.washington.uli.org), a non-profit organization that promotes the responsible use of land to enhance the environment.

Smart Growth America, www.smartgrowthamerica.com/health.html.

Natural Resources Defense Council, www.nrdc.org.

1 point

SS Credit 3.1**Brownfield Redevelopment: Basic Remediation Level****Intent**

Rehabilitate damaged sites where development is complicated by real or perceived environmental contamination, reducing pressure on undeveloped land.

Health Issues

With appropriate remediation, brownfield redevelopment has the potential to protect public health by safely removing health hazards from communities while preserving the public health benefits of undeveloped land.

Credit Goals

- Develop on a site documented as contaminated (by means of an ASTM E1903-97 Phase II Environmental Site Assessment) OR on a site classified as a brownfield by a local, state or federal government agency. Effectively remediate site contamination.

Documentation

- ❑ Document the pertinent sections of the ASTM E1903-97 Phase II Environmental Site Assessment describing the site contamination OR obtain documentation from a local, state or federal regulatory agency confirming that the site is classified as a brownfield by that agency.
- ❑ Obtain documentation, including test results, declaring the type of damage that existed on the site and describing the remediation performed.

Reference Standards

ASTM E1903-97 Phase II Environmental Site Assessment

Potential Technologies & Strategies

During the site selection process, consider opportunities and risks associated with potential brownfield sites. Identify tax incentives and property cost savings by selecting a brownfield site. Develop and implement a site remediation plan and clean up the site using remediation strategies such as pump-and-treat, bioreactors, land farming, and in-situ remediation. Consider plant selection strategies that incorporate varieties with a natural capacity to absorb and filter out pollutants.

1 point

SS Credit 3.2**Brownfield Redevelopment: Residential Remediation Level****Intent**

Rehabilitate damaged sites where development is complicated by real or perceived environmental contamination, reducing pressure on undeveloped land.

Health Issues

Redeveloping brownfields can be an effective strategy to improve environmental quality; however, stringent remediation technologies and standards are required in brownfield rehabilitation to protect the health and safety of the vulnerable people residing and working in a health care facility.

Existing brownfield regulations are inconsistent and differ greatly in their requirements. To achieve this additional Brownfield Redevelopment credit, the health care facility must insure protection of public health through rigorous remediation and consistent compliance with chemical thresholds for the most vulnerable.

Note that remediation of a single site may leave adjacent properties with problematic levels of contamination, thus potentially subjecting patients or the surrounding community to unhealthful exposure.

Credit Goals

- Develop on a site documented as contaminated (by means of an ASTM E1903-97 Phase II Environmental Site Assessment) OR on a site classified as a brownfield by a local, state or federal government agency.
- Remediate the site to the Residential level as defined by the EPA Region 9 Preliminary Remediation Guidelines.
- Obtain state agency clearance for construction of a hospital on the remediated site.
- Verify that the site is not within 2000 feet of another site documented as contaminated (by means of an ASTM E1903-97 Phase II Environmental Site Assessment) OR a site classified as a brownfield by a local, state, or federal government agency, unless remediated to the Residential level as defined by the EPA Region 9 Preliminary Remediation Guidelines.

Documentation

- q Document the pertinent sections of the ASTM E1903-97 Phase II Environmental Site Assessment describing the site contamination OR obtain documentation from a local, state or federal regulatory agency confirming that the site is classified as a brownfield.
- q Obtain documentation, including test results, demonstrating compliance with the EPA Region 9 regulations.
- q Obtain a copy of state agency clearance certification.
- q Obtain verification from the civil engineer or authorized party that the adjacent properties have been surveyed and determined not to be sources of potential hazards.

SS Credit 3 continued

Brownfield Redevelopment

Reference Standards

EPA Sustainable Redevelopment of Brownfields Program, www.epa.gov/brownfields.

EPA Region 9 Preliminary Remediation Guidelines,
<http://www.epa.gov/region9/waste/sfund/prg/index.htm>.

ASTM E1903-97

Potential Technologies & Strategies

During the site selection process, consider opportunities and risks associated with potential brownfield sites, as well as costs of remediation. Identify tax incentives and property cost savings by selecting a brownfield site. Develop and implement a site remediation plan and clean up the site using remediation strategies such as pump-and-treat, bioreactors, land farming, and in-situ remediation. Consider plant selection strategies that specify species with a natural capacity to absorb and filter out pollutants.

Resources

Rafson, Harold JI, and Rafson, Robert N., Brownfields, Redeveloping Environmentally Distressed Properties, 1999.

Russ, Thomas A., Redeveloping Brownfields, 2000.

1 point

SS Credit 4.1

Alternative Transportation: Public Transportation Access**Intent**

Reduce pollution and land development impacts from automobile use.

Health Issues

Motor vehicles represent the largest single source of atmospheric pollution including nitrogen oxides (a precursor of smog); benzene (a carcinogen); particulate matter (a trigger of respiratory illness and symptoms); volatile organic compounds (some of which are potentially hazardous and precursors of smog); carbon dioxide (a greenhouse gas); and carbon monoxide (a contributor to heart disease).

Credit Goals

- Locate the building entrance within 1/2 mile of a commuter rail, light rail or subway station or 1/4 mile of two or more public or campus bus lines usable by building occupants.

Documentation

- q Prepare an area drawing or transit map highlighting the building location and the fixed rail stations and bus lines, and indicate the distances between them. Include a scale bar for distance measurement.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Perform a transportation survey of future building occupants to identify transportation needs. Site the building near mass transit, or establish shuttle services to encourage use of mass transit options.

1 point

SS Credit 4.2**Alternative Transportation: Bicycle Storage and Changing Rooms****Intent**

Reduce pollution and land development impacts from automobile use.

Health Issues

Encouraging bicycling to work prevents emissions associated with motorized transport and enhances the health of the bicyclist. According to the World Health Organization, people who regularly commute by bicycle have a 40% reduction in mortality compared with people who do not bicycle to work.

Credit Goals

- Provide secure bicycle storage and convenient changing/shower facilities (within 200 yards of the building) for 3% or more of peak building day shift staff. Provide one shower per 8 cyclists. (Staff shower facilities within the building may be counted.)

Documentation

- c1** Compile site drawings and documents highlighting bicycle storage and changing and shower facilities. Include calculations demonstrating that these facilities have the capacity to accommodate a minimum of 3% of the day shift staff.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Design the building with transportation amenities such as bicycle storage and showering/changing facilities. Shower and changing facilities may be shared with those provided in Staff Locker facilities within the building.

Ideal bicycle storage for staff is enclosed lockers or other secure systems, conveniently located.

Consider the abilities of patients using the specific facility being designed. Patients treated in medical office buildings may be capable of commuting by bicycle, consistent with an emphasis on preventative medicine.

Conduct annual reviews of commute modes and preferences and increase bicycle storage capacity if needed to meet potential demand.

1 point

SS Credit 4.3**Alternative Transportation: Alternative Fuel Vehicles****Intent**

Reduce pollution from local emissions of fossil-fuel combustion powered vehicles.

Health Issues

Health care facilities normally operate fleets of vehicles for the purposes of maintaining and operating their facilities. These vehicles range from ambulances to delivery vans to shuttle buses, which often operate continuously and relatively locally. Motor vehicles represent the largest single source of atmospheric pollution including nitrogen oxides (a precursor of smog); benzene (a carcinogen); particulate matter (a trigger of respiratory illness and symptoms); volatile organic compounds (some of which are potentially hazardous and precursors of smog; carbon dioxide (a greenhouse gas); and carbon monoxide (a contributor to heart disease). By reducing emissions, alternative fuel fleets contribute to healthier air quality, benefiting the health of the building occupants and the surrounding and global communities.

Credit Goals

- Provide preferred parking and fueling stations for a 100% alternative fueled fleet if that fleet comprises a minimum of 50% of total fleet mileage driven annually. Acceptable fuel types include bio-diesel, low-sulphur diesel, hydrogen, compressed natural gas, hybrid or all-electric.

OR

- Install alternative-fuel refueling station(s) for 3% or more of the total vehicle parking capacity of the site.

OR

- Provide preferred parking programs for hybrid or alternative fuel vehicles for at least 10% of the total vehicle parking capacity.

Documentation

- Compile site drawings highlighting alternative fuel refueling stations. Provide calculations demonstrating that these facilities accommodate 100% of the alternative fueled fleet or at least 3% of the total vehicle parking capacity. Provide documentation that the alternative fuel refueling stations proposed will serve current available street legal vehicles.

OR

- Prepare calculations indicating that preferred parking for hybrid and/or alternative fuel vehicles is being provided for at least 10% of the total vehicle parking capacity. Provide site drawings or parking plan highlighting preferred parking for hybrid and/or alternative fuel vehicles.

Reference Standards

There is no reference standard for this credit.

SS Credit 4.3 continuedAlternative Transportation: **Alternative Fuel Vehicles**

Potential Technologies & Strategies

Alternative fuel vehicle fleets can be used to provide on campus transportation or between campus transportation, transportation to remote parking and staff housing, ambulance and ambulette fleets, and carpool/vanpool programs.

Low sulfur diesel fuel and biodiesel are becoming available in many markets nationwide, particularly in regions designated as non-attainment areas or where there are high levels of ground level ozone. Low sulfur diesel fuels can be used in all diesel engines without modifications. Biodiesel is usable in most diesel engines as well, although in some older engines may require changing of rubber gaskets and more frequent changing of filters during initial use as it cleans the system.

1 point

SS Credit 4.4**Alternative Transportation: Parking Capacity****Intent**

Reduce pollution and land development impacts from single occupancy vehicle use.

Health Issues

Motor vehicles represent the largest single source of atmospheric pollution including nitrogen oxides (a precursor of smog); benzene (a carcinogen); particulate matter (a trigger of respiratory illness and symptoms); volatile organic compounds (some of which are potentially hazardous and precursors of smog); carbon dioxide (a greenhouse gas); and carbon monoxide (a contributor to heart disease).

Credit Goals

- Size parking capacity to meet, but not exceed, minimum local zoning requirements OR health department regulatory authority, whichever is the overriding requirement, AND provide preferred parking for carpools or vanpools capable of serving 5% of the total building staff AND limit overall open-air paved vehicular circulation and parking area to 350 sf/stall.

OR

- For renovation projects, provide preferred parking and implement/document programs and policies for carpools and/or vanpools capable of serving 5% of the total building staff and add no new parking.

Documentation

- q Provide local zoning or health department requirements, as applicable.
- q Compile a description, parking plan, and supporting public outreach literature describing carpool and/or vanpool programs designed to serve 5% of the total building staff. Indicate preferred parking locations for carpools and vanpools. Prepare annual summary on carpool and vanpool usage.
- q For renovation projects, prepare a pre-renovation parking plan and a post-renovation parking plan demonstrating that no new parking capacity was added and that preferred parking policies for carpools and/or vanpools capable of serving 5% of the total building staff are adopted.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Minimize parking lot and garage size. Consider sharing parking facilities with adjacent buildings and implementing staff carpool and vanpool programs. Consider instituting shuttle bus services for staff members who live in the neighborhood, or to link with bus or rail lines.

1 point

SS Credit 5.1**Reduced Site Disturbance: Protect or Restore Open Space****Intent**

Conserve, preserve and enhance existing natural areas and restore damaged areas to provide habitat for native flora and fauna and promote biodiversity.

Health Issues

Healthy ecosystems promote healthy people by maintaining health-promoting qualities of air and water systems. By minimizing site disruption associated with construction practices, the health of these ecosystems can be protected. Health care facilities should protect and enhance the site's existing natural areas as a therapeutic resource. Research shows that physical and visual connections to the natural environment provide significant social, psychological and physical benefits for patients, staff and visitors.

Credit Goals

- On greenfield sites, limit site disturbance including earthwork and clearing of vegetation to 40 feet beyond the building perimeter, 15 feet beyond primary roadway curbs, 8 feet beyond walkways, 10 feet from the centerline of main utility trenches, and 10 feet beyond constructed areas with permeable surfaces (such as pervious paving areas, stormwater detention facilities and playing fields) that require additional staging areas. Protect and encourage the development of native vegetation. Native plants are those species that occur naturally in the particular region, state, ecosystem, and habitat without direct or indirect human actions.

OR

- On previously developed sites, restore a minimum of 50% of the site area (excluding the building footprint) by replacing impervious surfaces with emphasis on native and limited use of adapted vegetation. Insure that no adapted vegetation is a known invasive species. Native plants are those species that occur naturally in the particular region, state, ecosystem, and habitat without direct or indirect human actions.

Documentation

- q On Greenfield sites, compile a site disturbance plan demonstrating that site disturbances (including earthwork and clearing of vegetation) has been limited to 40 feet beyond the building perimeter, 15 feet beyond primary roadway curbs, 8 feet beyond walkways, 10 feet from the centerline of main utility trenches and 10 feet beyond constructed areas with permeable surfaces. Prepare a Site Protection Plan and specifications, by civil engineer or responsible party, noting limits of construction, disturbance, protection and enhancement measures.

OR

- q On previously developed sites, obtain a narrative describing restoration and re-vegetation of degraded habitat areas, including use of native and non-invasive adapted vegetation. Obtain highlighted site drawings with area calculations demonstrating that 50% of remaining open areas have been restored.

Credit 5.1 continued**Reduced Site Disturbance: Protect or Restore Open Space**

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Perform a site survey to identify site elements and adopt a master plan for development of the project site. Select a suitable building location and design the building with the minimal footprint to minimize site disruption. Strategies include stacking the building program, tuck-under parking and sharing facilities with neighbors.

Other strategies include locating the loading dock underneath the building and locating helipads on top of the building or as a component of other paved surface areas, such as a section of the parking lot, where possible, to reduce site disturbance. Establish clearly marked construction boundaries and provide adequate protection measures to minimize disturbance of existing site and restore previously degraded areas to their natural state. Other methods include protection of existing vegetation by protecting clusters or groupings of existing vegetation (i.e. tree or shrub masses) rather than isolated plant material in order to minimize unnecessary ground disturbance (topsoil stripping) and removal of existing groundcover.

Coordinate habitat, wetland, and stream preservation programs with erosion control and stormwater management goals, including soil bioengineering technologies. Adopt rehabilitation, restoration, and reclamation strategies for the site's watershed management.

1 point

SS Credit 5.2**Reduced Site Disturbance: Development Footprint****Intent**

Conserve, preserve and enhance existing natural areas and restore damaged areas to provide habitat for native flora and fauna and promote biodiversity.

Health Issues

Healthy ecosystems promote healthy people by maintaining balance in air and water systems, and by minimizing construction site disruption. Health care facilities can protect and enhance the site's existing natural areas as a therapeutic resource. Research shows that physical and visual connections to the natural environment provide social, psychological and physical benefits for patients, staff and visitors.

Credit Goals

- Reduce the development footprint (defined as entire building footprint, access roads and parking) so that open space on the site exceeds the local zoning requirement by 25%. For areas with no local zoning requirements (e.g., some university campuses and military bases), dedicate open space area adjacent to the building that is equal to the development footprint.

Documentation

- Compile a copy of the local zoning requirements highlighting the criteria for open space. Prepare a calculation demonstrating that the open space exceeds the local zoning open space requirement for the site by 25%.

OR

- For areas with no local zoning requirements, dedicate open space area adjacent to the building that is equal to the development footprint. Prepare a letter from the property owner stating that the dedicated open space will be conserved for the life of the building.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Perform a site survey to identify site elements and adopt a master plan for development of the project site. Select a suitable building location and design the building with the minimal footprint to minimize site disruption. Strategies include stacking the building program, tuck-under parking and loading docks, and sharing facilities with neighbors. Establish clearly marked construction boundaries to minimize disturbance of existing site and restore previously degraded areas to their natural state.

Coordinate habitat, wetland, and stream preservation programs with erosion control and stormwater management goals, including soil bioengineering technologies. Adopt rehabilitation, restoration, and reclamation strategies for the site's watershed management.

Health care facilities often contain provisions for helipads, which impact site development footprint. Consider locating the helipad on a rooftop or as a component of other paved surface area (a section of the parking lot) where possible to reduce site disturbance.

1 point

SS Credit 6.1**Stormwater Management: Rate and Quantity****Intent**

Limit disruption to channel stability and pollution of natural water flows by implementing a channel protection strategy.

Health Issues

Controlling stormwater run-off lessens contamination of receiving waters thereby reducing opportunities for human and wildlife exposure to waterborne pollutants, bacteria, and toxic chemicals that are linked to a variety of health effects including cancer, birth defects, and nervous system disorders.

Credit Goals

- If existing imperviousness is less than or equal to 50%, establish a stormwater management plan that protects downstream channel stability using a recognized channel protection strategy [e.g., Ontario's Distributed Run-off Control (*Final Stormwater Management Planning and Design Manual*, Ontario Ministry of the Environment 1999) or Maryland's Channel Protection Volume (*Maryland Stormwater Design Manual, Vol. I & II*, MDE 2000)]. At a minimum, the channel protection strategy shall prevent the post-development 2-year, 24-hour peak discharge rate from exceeding the pre-development 2-year, 24-hour peak discharge rate.

OR

- If existing imperviousness is greater than 50%, establish a stormwater management plan that results in a 25% decrease in the rate and quantity of run-off from the 1-year, 24-hour design storm.

Documentation

- Prepare calculations demonstrating that: (1) existing site imperviousness is less than or equal to 50%; and (2) a recognized channel protection strategy has been implemented; identify the recognizing authority.
- Prepare calculations demonstrating that the stormwater management strategies result in at least a 25% decrease in the rate and quantity of run-off from the 1-year, 24-hour design storm. Include calculations demonstrating that existing site imperviousness exceeds 50%.

Reference Standards

United States Environmental Protection Agency's (EPA's) Guidance Specifying Management Measures for Sources of Nonpoint- Pollution in Coastal Waters, January 1993 (Document No. EPA-840-B-92-002), www.epa.gov/OW.

Potential Technologies & Strategies

Design the project to maintain natural stormwater flows by using alternative surfaces (e.g., green roofs, pervious paving, vegetative filter strips) and promoting infiltration. Significantly reduce impervious surfaces, maximize on-site stormwater infiltration, and retain pervious and vegetated areas. Harvest and reuse stormwater run-off from impervious areas of the building for non-potable uses such as landscape irrigation. Consider permeable paving materials in the context of overall accessibility and the degree of mobility of the building users.

1 point

SS Credit 6.2**Stormwater Management: Treatment****Intent**

Limit disruption of natural water flows by reducing stormwater run-off, increasing on-site infiltration and eliminating contaminants.

Health Issues

Controlling stormwater run-off lessens contamination of receiving waters thereby reducing opportunities for human exposure to waterborne pollutants, bacteria and toxic chemicals that are linked to cancer, birth defects, and nervous disorders.

Credit Goals

- Establish a stormwater treatment systems plan that maintains annual groundwater recharge rates by promoting nonstructural practices and infiltration and captures and treats the run-off volume from either 90% of the average annual rainfall or 1" (2.54 cm) of rainfall. Structural Best Management Practices (BMPs) used to treat run-off shall be designed to remove 80% of the average annual post development total suspended solids load (TSS) and 40% of the average annual post-development total phosphorus load (TP) based on the average annual loadings from all storms less than or equal to the 2 year/24 hour design storm. Do so by implementing Best Management Practices (BMPs) outlined in Chapter 4, Part 2 (Urban Run-off), of the United States Environmental Protection Agency's (EPA's) Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, January 1993 (Document No. EPA-840-B-92-002) or the local government's BMP document (whichever is more stringent).

Documentation

- Compile plans, drawings, and calculations demonstrating that the design complies with or exceeds EPA or local government Best Management Practices (whichever is more stringent) for removal of total suspended solids and total phosphorous.

Reference Standard

United States Environmental Protection Agency's (EPA's) Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, January 1993 (Document No. EPA-840-B-92-002), www.epa.gov/OW.

Potential Technologies & Strategies

Use alternative surfaces (e.g., green roofs, pervious paving) and nonstructural practices (e.g., rain gardens, bio-swales, vegetative filter strips, disconnected impervious surfaces) to reduce imperviousness and promote infiltration. Use environmentally sensitive design strategies (e.g., Low Impact Development, Maryland Stormwater Design Manual) to design mechanical or natural treatment systems to treat the site's stormwater. Utilize biologically based and innovative stormwater management features for pollutant load reductions such as constructed wetlands, filters and open channels to treat stormwater run-off. Coordinate habitat, wetland, and stream preservation programs with erosion control and stormwater management goals, including soil bioengineering technologies. Adopt rehabilitation, restoration, and reclamation strategies for the site's watershed management.

1 point

SS Credit 7.1Heat Island Effect: **Non-Roof****Intent**

Reduce heat islands (thermal gradient differences between urban developed and undeveloped areas) to minimize impact on microclimates and human and wildlife habitat.

Health Issues

Mitigating the heat island effect results in lowering ground level temperatures near buildings thereby reducing conditions favorable for ground-level ozone (smog) formation that can lead to respiratory illness. In addition, a cooler microclimate reduces a building's cooling load, thereby curbing reliance on fossil-fuel generated electricity, and reducing associated particulate and greenhouse gas emissions.

Credit Goals

- Provide shade (within 5 years) and/or use light-colored, high-albedo and/or open grid pavement with a Solar Reflectance Index (SRI) of at least 30 for at least 30% of the site's hardscape including parking areas, walkways, plazas, fire lanes, roads, etc..

OR

- Place a minimum of 50% of parking spaces underground or covered by structured parking.

OR

- Use an open grid pavement system (less than 50% impervious for a minimum of 50% of the parking lot area.

Documentation

- q** Compile a site plan and develop calculations demonstrating areas of hardscape including paving, walking areas, plazas, fire lanes, etc. and landscaping (list species) and building footprint, and declaring that:

- A minimum of 30% of non-roof impervious surfaces areas are constructed with high-albedo materials and/or open grid pavement and/or will be shaded within five years. The SRI must be calculated in accordance with ASTM E 1989-98 for the hardscape and have a minimum SRI of 30. Reflectance values used to calculate SRI are based on field measurements based on ASTM E1918-97 procedure. Emissivity values used to calculate SRI are based on Table 1 or field measurements using ASTM E 408-71 procedure.

OR

- A minimum of 50% of parking spaces have been placed underground or are covered by structured parking.

OR

- An open-grid pavement system (less than 50% impervious) has been used for a minimum of 50% of the parking lot area.

Table 1

Material	Initial Solar Reflectance	3-year Solar Reflectance	Emissivity	Initial Solar Reflectance Index (SRI)	3-year Solar Reflectance Index (SRI)
Asphalt Paving-new	0.04	0.12	0.9	0	8.7
Asphalt Paving=aged 5+years	0.12	N/A	0.9	8.7	N/A
Chip-Seal w 0.28 albedo aggregate ¹	0.28	0.20	0.9	29	18.8
Gray Portland Cement Concrete ¹	0.35 ^b	0.2 ^b	0.88	36	17
White Portland Cement Concrete ¹	0.7 ^b	0.4 ^b	0.88	85	44

¹ Reflectance must be field verified using ASTM E1918-97 procedure.

^a From Kreith, F., "Principles of Heat Transfer," Intext Educational Publishers, New York, 1973.

^b American Concrete Pavement Association, "Concrete Pavement Research & Technology Update." Number 3.05, June 2002.

^c Calculated value based on characteristics of each material.

^d ASHRAE Handbook of Fundamentals, 2001.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Employ strategies, materials and landscaping techniques to reduce heat absorption of exterior materials. Shade constructed surfaces on the site with landscape features (native or non-invasive, climate tolerant trees and large shrubs, vegetated trellises, or other exterior structures supporting vegetation) and minimize the overall building footprint. Consider replacing constructed surfaces (i.e., roads, sidewalks) with vegetated surfaces such as gardens and open grid paving or specify light-colored, high-albedo materials to reduce the heat absorption.

Resources

Pomerantz, M., Akbari, H., and Chang, S.C., "The Effect of Pavements' Temperature on Air Temperatures in Large Cities," Lawrence Berkeley National Laboratory Report No. LBNL- 43442, Berkeley, CA.

1 point

SS Credit 7.2Heat Island Effect: **Roof****Intent**

Reduce heat islands (thermal gradient differences between developed and undeveloped areas) to minimize impact on microclimate and human and wildlife habitat.

Health Issues

Mitigating the heat island effect results in lowering ground level temperatures near buildings thereby reducing conditions favorable for ground-level ozone (smog) formation that can lead to respiratory illness. In addition, a cooler microclimate reduces a building's cooling load, thereby curbing reliance on fossil-fuel generated electricity, and reducing associated particulate and greenhouse gas emissions.

Credit Goals

- Specify Energy Star® compliant (highly reflective) AND high emissivity roofing (emissivity of at least 0.9 when tested in accordance with ASTM 408) roofing having a Solar Reflectance Index (SRI) as required in Table 2 for a minimum of 75% of the roof surface.

Table 2

Roof Type	Slope	SRI
Low-Sloped Roof	≤ 2:12	78
Steep-Sloped Roof	> 2:12	76

OR

- Install a "green" (vegetated) roof for at least 50% of the roof area. Combinations of high albedo SRI roof and vegetated roof can be used if they meet in combination the Total Roof Area ≤ ((Area of SRI Roof * 1.33) + (Area of vegetated roof * 2)).

Documentation

- Document that the roof complies with the following requirements:
- The SRI is equal or greater than the value required in Table 2 for the building's specified roof type.
 - Reflectance values used to calculate SRI are based on values from product ratings from the Cool Roof Rating Council's (CRRC) *Directory of Rated Products* or the U.S. EPA Energy Star Program's *Rated Products* list or Independent Laboratory testing in accordance with ASTM E903-96 for homogeneous, non-patterned materials having both specular and diffused optical properties OR ASTM E1084 for inhomogeneous, patterned, or corrugated materials OR field measurements using ASTM E1918-97 procedure.
 - Emissivity values used to calculate SRI are based upon product ratings from the CRRC's *Directory of Rated Products* OR field measurements using ASTM E 408-71 procedure.
 - 75% of the building's total roof area meets the applicable SRI requirement in Table 2.

OR

- Prepare calculation indicating Total Roof Area ≤ ((Area of SRI Roof * 1.33) + (Area of vegetated roof * 2)) demonstrating compliance using combined approaches.

OR

SS Credit 7.2 continued

Heat Island Effect: **Roof**

- Prepare photographs and calculations demonstrating that vegetated roof areas constitute at least 50% of the total roof area, and prepare maintenance plan for the vegetated roof system.

Reference Standards

EPA Energy Star Roofing Guidelines, United States Environmental Protection Agency, Energy Star®, www.energystar.gov.

ASTM E408-71(1996)e1 - Standard Test Method For Total Normal Emittance Of Surfaces Using Inspection-Meter Techniques, www.astm.org,

Potential Technologies & Strategies

Employ strategies, materials and landscaping techniques that reduce heat absorption of exterior materials. Explore the use of new coatings, roof materials and colorants to achieve reflectance and emissivity values. Use photovoltaic cells for roof shading.

1 point

SS Credit 8**Light Pollution Reduction****Intent**

Eliminate light trespass from the building and site, improve night sky access, and reduce development impact on nocturnal environments.

Health Issues

Light pollution has been found to have a potential link to hormone production, specifically related to melatonin and possibly estrogen levels in women. Light-related decreases in melatonin and increased estrogen levels may be causally related. Increases in estrogen levels in women are linked to breast cancer.

Credit Goals

- Meet or provide lower light levels than those recommended by the Illuminating Engineering Society of North America (IESNA) *Recommended Practice Manual: Lighting for Exterior Environments* (RP-33-99). Meet uniformity ratios recommended by IESNA *Recommended Practice Manual: Lighting for Exterior Environments* (RP-33-99).
- Design exterior lighting such that all exterior luminaires with more than 1000 initial lamp lumens are shielded and all luminaires with more than 3500 initial lamp lumens meet the Full Cutoff IESNA Classification.
- Assure that the maximum candela value of all interior lighting falls within the building (not out through windows) and the maximum candela value of all exterior lighting falls within the property.
- Assure that any luminaire within a distance of 2.5 times its mounting height from the property boundary has shielding such that no light from that luminaire crosses the property boundary.
- Zone and control lights to allow for limiting night-time lighting to the Emergency Department, a small employee parking area, a small visitor parking area, pedestrian walkways, and circulation routes.

Documentation

- q Compile a brief exterior lighting system narrative describing the lighting objectives and the measures taken to meet the ambient light and direct beam illumination requirements.
- q Compile an electrical site plan showing the zoning of the light fixtures and the control system for the fixtures.

Reference Standards

Illuminating Engineering Society of North America (IESNA) *Recommended Practice Manual: Lighting for Exterior Environments* (RP-33-99), www.iesna.org.

Potential Technologies & Strategies

Adopt site lighting criteria to maintain safe light levels while avoiding off-site lighting and night sky pollution. Minimize site lighting where possible and model the site lighting using a computer model. Technologies to reduce light pollution include full cutoff luminaires, low-reflectance surfaces and low-angle spotlights.

1 point

SS Credit 9**Connection to the Natural World: Places of Respite****Intent**

Provide places of respite on the health care campus to connect health care patients, visitors, and staff to the natural environment.

Health Issues

Health care facility design should address the physical, emotional, and spiritual needs of the patients and/or residents, family members, visitors and staff that inhabit these buildings. Privacy, confidentiality, security, dignity, comfort, orientation, and connection to nature are key elements and issues that need to be addressed in the design of supportive environments.

Places of respite connected to the natural environment are key elements in defining a supportive, high performance healing environment with proven effects on patient and staff well-being and improved clinical outcomes. A growing body of research indicates that patients and medical staff benefit from access to daylight and landscape views. Providing a variety of spaces for patients, families, and caregivers to pause and experience their natural surroundings is an important programming and design objective.

Credit Goals

- Establish 5% of the net usable program area as specifically programmed places of respite with direct connection to the natural environment, conveniently located and easily accessible and identifiable to patients, visitors, and staff. Provide at least one place of respite dedicated to staff and separate from patients and visitors.
- Provide at least one outdoor place of respite conveniently located and easily accessible and identifiable to patients and visitors. Provide at least one outdoor place of respite dedicated to staff that is easily accessible and is designated non-smoking.

Documentation

- Compile floor plans highlighting places of respite.
- Compile building program and calculation showing the 5% credit goal has been met.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Select appropriate locations for places of respite, taking into account architectural and engineering factors (structural loads, etc.); environmental factors (winds, orientation, views, etc.); programs of care (Horticultural Therapy, etc.); the needs of specific patient populations (immune suppression, sunlight sensitivity, etc.) and realistic levels of maintenance. Consider issues of wayfinding and orientation, accessibility, strength and stamina, activity and interest, privacy, independence. Provide choice and variety in the design of spaces (for example, spaces that engage all the senses but also areas with limited sensory stimulation). Consider a variety of smaller spaces conveniently located throughout the facility rather than one large space.

SS Credit 9 continued

Connection to the Natural World: **Places of Respite**

Strategies include on-grade and rooftop gardens; arrival, interior atrium and greenhouse gardens; universal access path systems; sitting areas or vestibules or wide corridors that offer views of nature and places to pause and/or adjacent destination and display areas of flora and fauna. Consider the development of on-grade gardens and green spaces that will also help integrate the facility into the surrounding community. Coordinate the integration of gardens and nature for interior and exterior environments with the facility's Infectious Disease Control Specialist. This includes addressing concerns of chemical sensitivities and allergens with certain high-pollen plant materials.

Places of respite may include family consultation spaces, lounges, cafés, grieving rooms, meditation spaces or chapels, resource areas and libraries. Designated staff break areas, exercise spaces, and resource areas may be considered. To qualify, these spaces must have direct connection to the natural environment and must be spaces where no medical intervention or direct medical care is delivered. Direct connection to the natural environment includes views of distant and nearby nature (such as inaccessible rooftop spaces with "green" (vegetated) roofs and mature street trees).

In development of room data sheets or project space programs, include criteria for orientation relative to major exterior views and other natural features (daylight, seasonal variations, sound of water).

1 point

SS Credit 10.1**Community Contaminant Prevention: Airborne Releases****Intent**

Minimize building airborne effluents and environmental, safety, and health impacts to site and neighbors.

Health Issues

Health care facilities include laboratories, pharmacies, and diagnostic services, which generate substances toxic to patients, staff, visitors, and the neighboring communities. Human health effects associated with exposure to airborne toxicants, particulates, gases, and bioaerosols may include respiratory diseases (e.g., asthma, hypersensitivity pneumonitis, bronchitis); cardiovascular events (e.g., sudden death associated with particulate air pollution), among others, depending on exposure levels.

Credit Goals

- Exceed by 10% the NIH-CDC Guidelines for Airborne Effluent from Laboratories that Handle Biohazards (CDC-NIH Biosafety in Microbiological and Biomedical Laboratories, latest edition (currently May 1999).
- Meet all standards of California South Coast Air Quality Management District for all products of combustion.

Documentation

- q Obtain documentation from the mechanical engineer of record that the NIH-CDC Guidelines for Airborne Effluent from Laboratories that Handle Biohazards have been exceeded by 10% and all California South Coast Air Quality Management District standards for products of combustion have been met.

Reference Standards

National Institutes for Health - CDC Guidelines for Airborne Effluent from Laboratories that Handle Biohazards (CDC-NIH Biosafety in Microbiological and Biomedical Laboratories, latest edition (currently May 1999).

California South Coast Air Quality Management District, www.aqmd.gov.

Potential Technologies & Strategies

Provide scrubbers and filters for boilers and diesel generators.

Test and certify all filters as installed prior to occupancy and placard them for at least annual recertification.

Burn fuels low in sulfur content. Provide air quality abatement equipment for equipment that burns fossil fuels.

Burn bio-diesel fuels in lieu of fossil fuels.

Substitute ground-cooled heat exchanger for cooling tower to eliminate biohazard from cooling water.

1 point

SS Credit 10.2**Community Contaminant Prevention: Leaks & Spills****Intent**

Prevent releases of hazardous chemicals and fuels to storm sewer.

Health Issues

Health care facilities store and manage chemicals in both underground tanks and other outdoor facilities. Along with run-off from parking areas, these are significant potential sources of surface and groundwater contamination. By minimizing potential exposure, health care facilities can contribute to protecting the health of the surrounding community.

The reference standards cited below are more stringent than many local and state regulatory thresholds and are designed to ensure that contamination risks associated with chemical storage are reduced.

Credit Goals

- Establish oil interceptors at all drains from parking areas and central plant areas.
- Comply with California Health & Safety Code Section 25290.1 and 25291 for the installation of fuel oil storage tanks to prevent release of diesel fuels.

Documentation

- q Compile design documentation of on-site fuel oil storage system(s).
- q Compile a plan indicating the location of all storage facilities, and a narrative describing secondary containment provisions.

Reference Standards

California Health & Safety Code Section 25290.1 and 25291,
<http://www.leginfo.ca.gov/cgi-bin/calawquery?codesection=hsc>.

Title 40, Code of Federal Regulations, Part 112 (for spill control and countermeasures).

Potential Technologies & Strategies

Ensure that storage facilities include secondary containment provisions to prevent unintentional spills and leakage from contaminating aquifers and stormwater.

Provide oil interceptors at all drains from parking areas and from central plant areas.

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Water Efficiency

Required

WE Prerequisite 1

Potable Water Use for Equipment Cooling

Intent

Eliminate potable water use for equipment cooling.

Health Issues

Maintaining adequate potable water supplies is a basic necessity for the health of individuals and communities. Only about 1% of the water on Earth is fresh water. Processing potable water is energy intensive and thus contributes to air emissions associated with fossil fuel energy generation (for the treatment, pumping and maintenance of the potable water systems). Only about 20% of current urban water is used for drinking and sanitary purposes, with the other 80% not requiring treatment to potable standards. Using reclaimed water for selected applications can reduce costs and preserve precious potable water supplies. To protect the public health, a dual or dedicated distribution system must be installed to segregate potable and reclaimed water for health, product and process purposes.

Credit Goals

- Do not use potable water for once through cooling for any equipment. (This credit does not apply to potable water for cooling tower makeup, or for other evaporative cooling systems; refer to WE Credit 4 for Process Water Use Reduction.)

Documentation

- Compile documentation of technologies employed to eliminate “once-through” use of potable water for all equipment cooling purposes.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Use closed-loop cooling water for equipment cooling instead of open-loop (once-through). Often, cooling of equipment is considered a critical application, where redundancy is desired to significantly reduce or eliminate the possibility of a loss of cooling. When using closed-loop cooling systems for critical applications (i.e. where failure of equipment due to loss of cooling would result in danger to patients or medical personnel, damage to equipment, loss of medical information, or other significant adverse impacts), owners should utilize multiple pieces of cooling equipment (n+1 redundancy). Where this is not possible, an owner may elect to use potable water in an open-loop (once-through) configuration as the *emergency back-up* cooling system only. Such emergency back-up systems shall only be used in the event that the primary closed-loop cooling equipment has failed, and such a failure is visually and audibly indicated at the point of use and alarmed at a continuously monitored location.

Use non-potable water sources for once-through cooling applications.

1 point

WE Credit 1.1**Water Efficient Landscaping: Reduce Potable Water Use by 50%****Intent**

Limit or eliminate the use of potable water for landscape irrigation.

Health Issues

Maintaining adequate potable water supplies is a basic necessity for the health of individuals and communities. Only about 1% of the water on Earth is fresh water. Processing potable water is energy intensive and thus contributes to air emissions associated with fossil fuel energy generation (for the treatment, pumping and maintenance of the potable water systems). Only about 20% of current urban water is used for drinking and sanitary purposes, with the other 80% not requiring treatment to potable standards. Using reclaimed water for selected applications can reduce costs and preserve precious potable water supplies. To protect the public health, a dual or dedicated distribution system must be installed to segregate potable and reclaimed water for health, product and process purposes.

Native landscapes can dramatically lower irrigation requirements, with little if any supplemental irrigation required after plant establishment, and attract native wildlife, birds, and insects, creating a building site integrated with its natural surroundings.

Credit Goals

- Reduce potable water consumption from irrigation by at least 50% over conventional means. Landscaped area must include a minimum of one-half acre outside of the building. Do not use water from wells or rivers for site irrigation purposes.

Documentation

- q Prepare calculations substantiating that potable water consumption for irrigation has been reduced by 50%. Use calculation methodology as described in LEED v2.1 Reference Guide (pages 84 – 88) Include a brief narrative of the equipment used and/or the use of native plants or non-invasive drought-tolerant plants.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Perform a soil and climate analysis to determine appropriate landscape types and design the landscape with indigenous plants to reduce or eliminate irrigation requirements. Use high-efficiency irrigation systems and consider using stormwater, recycled site water and/or greywater for irrigation.

Specify and install a roof-water or groundwater collection system. Use metal, clay, or concrete based roofing materials and take advantage of gravity water flows whenever possible. Roofing materials made of asphalt or with lead-containing materials contaminate collected rainwater and render it unsuitable. Check with local regulatory authorities regarding the collection of rainwater as there may be local regulations governing rainwater collection and reuse.

High efficiency irrigation strategies include micro-irrigation systems, moisture sensors, clock timers, and weather database controllers. These systems are significantly more water efficient than conventional irrigation systems.

1 point in addition to WE 1.1

WE Credit 1.2**Water Efficient Landscaping: No Potable Water Use or No Irrigation****Intent**

Limit or eliminate the use of potable water for landscape irrigation.

Health Issues

Maintaining adequate potable water supplies is a basic necessity for the health of individuals and communities. Only about 1% of the water on Earth is fresh water. Processing potable water is energy intensive and thus contributes to air emissions associated with fossil fuel energy generation (for the treatment, pumping and maintenance of the potable water systems). Only about 20% of current urban water is used for drinking and sanitary purposes, with the other 80% not requiring treatment to potable standards. Using reclaimed water for selected applications can reduce costs and preserve precious potable water supplies. To protect the public health, a dual or dedicated distribution system must be installed to segregate potable and reclaimed water for health, product and process purposes.

Native landscapes can dramatically lower irrigation requirements, with little if any supplemental irrigation required after plant establishment, and attract native wildlife, birds, and insects, creating a building site integrated with its natural surroundings.

Credit Goals

- Use only captured rain or recycled site water to eliminate all potable water consumption for site irrigation (except for initial watering to establish plants). Landscaped area must include a minimum of one-half acre outside of the building. Do not use water from wells or rivers for site irrigation purposes.

OR

- Do not install permanent landscape irrigation systems.

(Note that earning this credit automatically earns WE Credit 1.1)

Documentation

- q** Obtain documentation verifying that the project site will not use potable water for irrigation (except for initial watering to establish plants). Include a narrative describing the captured rain system, the recycled site water system, and their holding capacity. List all the plant species used. Include calculations demonstrating that irrigation credit goals can be met from captured rain or recycled site water.

OR

- q** Document that the project site does not have a permanent landscape irrigation system. Include a narrative describing how the landscape design allows for this.

Reference Standards

There is no reference standard for this credit.

WE Credit 1.2 continued

Water Efficient Landscaping: **No Potable Water Use or No Irrigation**

Potential Technologies & Strategies

Perform a soil and climate analysis to determine appropriate landscape types and design the landscape with indigenous plants to eliminate irrigation requirements.

Specify and install a roof-water or groundwater collection system. Use metal, clay, or concrete based roofing materials and take advantage of gravity water flows whenever possible. Roofing materials made of asphalt or with lead-containing materials contaminate collected rainwater and render it unsuitable. Check with local regulatory authorities regarding the collection of rainwater, as there may be local regulations governing rainwater collection and reuse. Harvest non-potable building water for site irrigation through use of on-site storage tanks, equipped with filters and pumps as appropriate.

1 point

WE Credit 2**Innovative Wastewater Technologies****Intent**

Reduce generation of wastewater and potable water demand while increasing the local aquifer recharge.

Health Issues

Maintaining adequate potable water supplies is a basic necessity for the health of individuals and communities. Only about 1% of the water on Earth is fresh water. Conventional wastewater systems require significant volumes of water to convey waste to municipal wastewater treatment facilities. Replacing potable water used for sewage conveyance with greywater and/or captured rainwater, or significantly reducing or eliminating potable water use through the installation of waterless or ultra-low flow fixtures, preserves precious potable water sources. Processing potable water is energy intensive and thus contributes to air emissions associated with fossil fuel energy generation (for the treatment, pumping and maintenance of the potable water systems). Only about 20% of current urban water is used for drinking and sanitary purposes, with the other 80% not requiring treatment to potable standards. Using reclaimed water for selected applications can reduce costs. To protect the public health, a dual or dedicated distribution system must be installed to segregate potable and reclaimed water for health, product and process purposes.

Credit Goals

- Reduce the use of municipally provided potable water for building sewage conveyance by a minimum of 50%.

OR

- Treat 100% of wastewater on site to tertiary standards.

Documentation

- q** Prepare calculations and a narrative describing the measures used to reduce wastewater by at least 50% from baseline conditions. Use Energy Policy Act of 1992 fixture flow rates for the baseline case. Use calculation methodology as described in LEED v2.1 Reference Guide (pages 95 - 97).

OR

- q** Obtain documentation verifying that 100% of wastewater will be treated to tertiary standards on site. Include narrative describing the on-site wastewater treatment system.

Reference Standards

Tertiary Standard is the highest form of wastewater treatment and includes removal of organics, solids and nutrients as well as biological or chemical polishing, to effluent limits of 10 mg/L BOD5 and 10 mg/L TSS.

Potential Technologies & Strategies

Specify ultra-low flow fixtures and dry fixtures such as composting toilets and waterless urinals to reduce wastewater volumes.

WE Credit 2 continued**Innovative Wastewater Technologies**

Develop a wastewater inventory and determine areas where greywater can be used for functions conventionally served by potable water. These might include toilets, irrigation, and other non-patient contact applications such as cooling tower makeup. Consider reusing stormwater or greywater for sewage conveyance or on-site wastewater treatment systems (mechanical and/or natural).

The construction of artificial wetlands for wastewater treatment can be incorporated on multiple scales, from individual buildings to campus wide facilities. As wastewater moves through the wetlands, plants and microbes naturally remove water contaminants. An alternative technology is aquaculture, where contaminants in the wastewater are food for fish and plants.

Resources

Constructed Wetlands for Wastewater Treatment and Wildlife Habitat: 17 case studies, EPA 832/B-93-005, 1993.

2 points

WE Credit 3**Domestic Potable Water Use Reduction****Intent**

Maximize potable water efficiency within buildings to reduce the burden on municipal water supply and wastewater systems.

NOTE: This credit refers to domestic potable water use. For reduction of potable water use in cooling and process applications, refer to WE Credit 4, Process Water Use Reduction. For reduction of potable water uses in irrigation, refer to WE Credit 1, Water Efficient Landscaping.

Health Issues

Maintaining adequate potable water supplies is a basic necessity for the health of individuals and communities. Only about 1% of the water on Earth is fresh water. Processing potable water is energy intensive and thus contributes to air emissions associated with fossil fuel energy generation (for the treatment, pumping and maintenance of the potable water systems). Only about 20% of current urban water is used for drinking and sanitary purposes, with the other 80% not requiring treatment to potable standards. Using reclaimed water for selected applications can reduce costs. To protect the public health, a dual or dedicated distribution system must be installed to segregate potable and reclaimed water for health, product and process purposes.

Credit Goals

- **Credit 3.1 (1 credit)** Employ strategies that in aggregate use 20% less water than the water use baseline calculated for the building (not including irrigation or process uses) after meeting the Energy Policy Act of 1992 fixture performance requirements.
- **Credit 3.2 (1 credit)** Employ strategies that in aggregate reduce water usage by an additional 10% (total 30%) from the water use baseline calculated for the building (not including irrigation or process uses) after meeting the Energy Policy Act of 1992 fixture performance requirements.

Documentation

- Prepare the spreadsheet calculation demonstrating that water-consuming fixtures specified for the stated occupancy and use of the building reduce occupancy-based potable water consumption by the specified percentage compared to baseline conditions.
- Maintain cut sheets for all water consuming fixtures necessary for the occupancy use of the building, with water conservation specifications highlighted.

Reference Standards

The Energy Policy Act (EPACT) of 1992, <http://tis.eh.doe.gov/nepa>.

Potential Technologies & Strategies

Estimate the potable and non-potable water needs for the building. Develop a water use inventory in conjunction with WE Credit 2 that includes all water consuming fixtures (not including irrigation or process uses), and use this to identify significant potable water demands and determine methods to minimize or eliminate these demands. Use Energy Policy Act of 1992 fixture flow rates for the baseline case. (Use calculation methodology as described in LEED v2.1 Reference Guide (pages 103-106).)

WE Credit 3 continued**Domestic Potable Water Use Reduction**

Use high-efficiency fixtures, dry fixtures such as composting toilets and waterless urinals, and occupant sensor controls to reduce potable water demand. Consider reuse of stormwater or greywater for non-potable applications such as toilet and urinal flushing, mechanical systems (see WE Credit 4.2) and custodial uses.

Water-efficient shower heads are available that require less than 2.5 GPM. Lavatory faucets are typically used only for wetting purposes and can be effective with as little as 1.0 GPM. Water-saving faucet aerators can be installed that do not change the feel of the water flow. Specify self-closing, slow-closing or electronic sensor faucets, particularly in high-use public areas where it is likely that faucets may be carelessly left running. Water closets are a significant user of potable water. There are a number of toilets that use considerably less than 1.6 GPF, including pressure-assisted toilets and dual flush toilets that have an option of 0.8 GPF or 1.0 GPF.

1 point

WE Credit 4.1**Process Water Use Reduction: Measurement and Verification****Intent**

Provide for the ongoing accountability and optimization of building water consumption performance over time.

Health Issues

Approximately 70% of the potable water consumption in health care facilities is attributable to process water uses, compared to less than 30% consumed for “domestic” use. Maintaining adequate potable water supplies is a basic necessity for the health of individuals and communities. Only about 1% of the water on Earth is fresh water. Processing potable water is energy intensive and thus contributes to air emissions associated with fossil fuel energy generation (for the treatment, pumping and maintenance of the potable water systems).

Credit Goals

- Provide for long term continuous measurement of potable water uses within the facility.
- Meter the following water uses (as applicable to the project):
 - Water use in laboratory
 - Water use in dietary department
 - Water use in central sterile and processing department
 - Water use in laundry
 - Water use in radiology and imaging department
 - Water use in surgical suite
 - Purified water system (reverse osmosis and/or de-ionized) and filter backwash water
 - Outdoor irrigation systems
 - Cooling tower make-up and filter backwash water
 - Steam boiler system make-up water
 - Closed loop hydronic system make-up water

Documentation

- q Compile a Measurement & Verification Plan with summary schedule of the instrumentation and controls for the required monitoring categories, highlighting the I/O data points to be collected.
- q Document the monitoring system, including cut sheets of sensors and the data collection system.

Reference Standards

International Performance Measurement and Verification Protocol Volume 1, 2001 Version,
<http://www.ipmvp.org/>.

Potential Technologies & Strategies

Design the building with equipment to measure water performance. Submeter potable water systems. Use measured system data to identify opportunities for reduced use of potable water.

1 point

WE Credit 4.2**Process Water Use Reduction: Low or No Water Use Building System Equipment****Intent**

Reduce or eliminate the use of potable water for non-potable process use in building system equipment.

Health Issues

Approximately 70% of the potable water consumption in health care facilities is attributable to process water uses, compared to less than 30% consumed for “domestic” use. Maintaining adequate potable water supplies is a basic necessity for the health of individuals and communities. Only about 1% of the water on Earth is fresh water. Processing potable water is energy intensive and thus contributes to air emissions associated with fossil fuel energy generation (for the treatment, pumping and maintenance of the potable water systems).

Credit Goals

- Use building system equipment (pumps, compressors, cooling towers, etc) that reduce the use of potable water by at least 10% in comparison to that of comparable equipment that use potable water for a process use. Minimum water savings must be at least 100,000 gallons annually.

Documentation

- q Compile a spreadsheet listing all new or renovated building system equipment that would conventionally use potable water for process use (cooling, seal, backwash, etc.). Compare with similar equipment that reduces or eliminates the use of potable water for process use. Calculate annual water savings for the use of this equipment.

OR

- q Compile construction drawings showing system components and arrangements for collection of air conditioning condensate, stormwater runoff, or other site non-potable water for use in cooling tower makeup.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Specify equipment with low or no usage of potable water (e.g., waterless vacuum pumps and air compressors, mechanical seals on pumps, drift eliminators on cooling towers, combination sensible and evaporative cooling towers, cooling tower water centrifugal separators, demand controlled or closed circuit condensate coolers)., Compare water use by equipment that has low or no potable water use with comparable equipment (e.g. water seal vacuum pumps versus waterless, or cooling tower sidestream centrifugal separators versus sand filters) – substantial (10% or more) process potable water use reduction by building mechanical system or medical equipment is easily achieved.

Design systems to capture air handling system condensate for use in non-potable applications such as cooling tower makeup or irrigation.

Energy & Atmosphere

Required

EA Prerequisite 1

Fundamental Building Systems Commissioning

Intent

Verify and ensure that fundamental building elements and systems are designed, installed and calibrated to operate as intended.

Health Issues

Commissioning verifies the efficient and effective operations of a building's mechanical systems, thus ensuring compliance with indoor air quality and thermal comfort design criteria, and lessening dependence on natural resources resulting in improved outdoor air quality and reduced greenhouse gas emissions.

Credit Goals

- Establish or have a contract in place to establish the following best practice commissioning procedures:
- Engage a commissioning team that does not include individuals directly responsible for project design or construction management.
- Review the design intent and the basis of design documentation.
- Incorporate commissioning requirements into the construction documents.
- Develop and utilize a commissioning plan.
- Verify installation, functional performance, training and operation and maintenance documentation.
- Complete a commissioning report.

Documentation

- Document that the fundamental commissioning requirements have been successfully executed or will be provided under existing contract(s).

Reference Standard:

There is no reference standard for this credit.

Potential Technologies and Strategies

Engage a commissioning authority and adopt a commissioning plan. Include commissioning requirements in bid documents and task the commissioning authority to produce a commissioning report once commissioning activities are completed. Hospitals and health care systems with in-house expertise in design and commissioning may perform this work. However, this is extremely specialized expertise and the Owner may benefit from engaging a credentialed Commissioning Authority.

Required

EA Prerequisite 2

Minimum Energy Performance

Intent

Establish the minimum level of energy efficiency for the base building and systems.

Health Issues

Lower building energy use results in reduced combustion of fossil fuels for source energy generation. Energy efficiency benefits health by reducing emissions from the products of combustion, including less particulates and pollutants, which in turn help to improve outdoor air quality. Greenhouse gas emissions, which contribute to global climate change, are also reduced.

Credit Goals

Many codes applicable to health care facilities have requirements that preclude the building from meeting ASHRAE 90.1 requirements. This section has been designed to allow a building baseline computation that recognizes regulatory context. This credit distinguishes between buildings regulated by health code requirements which exempt them from all or portions of local energy code requirements, from those that are required to meet local energy codes.

- For acute care hospitals, long term care facilities or freestanding surgery centers with regulatory requirements that are exempt from all or portions of the local energy code, design to meet or exceed the baseline energy performance as defined below under Documentation.
- For buildings not exempted from any portion of the local energy codes, design to meet building energy efficiency and performance as required by the local energy code or ASHRAE/IESNA 90.1-2004, which ever is more stringent.
- For all buildings, create an estimate of whole building energy consumption as defined below under Documentation, and determine the Energy Performance Rating for your facility design using EPA's Target Finder rating tool.
- This prerequisite may not be appropriate for small renovations that do not significantly affect the fundamental energy systems for the area. This prerequisite can be applied to renovations that substantially alter the fundamental energy systems.

Documentation

- q** For acute care hospitals, long term care facilities or freestanding surgery centers with regulatory requirements that are exempt from all or portions of the local energy code:

 - Model anticipated building energy performance in accordance with ASHRAE 90.1-2004 Appendix G as modified by the Design Assumptions in GGHC Appendix 1, using DOE2.1E or Energy Plus.
 - Demonstrate that the proposed building performance meets the ASHRAE 90.1-2004 Energy Cost Budget.
- q** For acute care hospitals, long term care facilities or freestanding surgery centers, medical office buildings, clinics or health care buildings not exempted from any portion of the local energy codes:

 - Prepare calculations verifying that the building complies with ASHRAE/IESNA 90.1-2004 using the Energy Cost Budget Method, or local energy codes. If local energy codes were applied, demonstrate that the local code is equivalent to, or more stringent than, ASHRAE/IESNA 90.1-2004 .

EA Prerequisite 2 continued

Minimum Energy Performance

- Prepare a summary table of design features that minimally comply with applicable mandatory requirements in ASHRAE/IESNA 90.1-2004, Sections 5-10, or local energy codes.

- For all buildings, calculate anticipated whole building energy performance using DOE2.1E or Energy Plus modeling results. Use the Process Loads Procedures and Assumptions listed in Appendix 1 to create a whole building energy consumption estimate from the results of the modeling.

- Determine the Energy Performance Rating for your facility design using EPA's Target Finder rating tool. The GGHC is exploring new methods and tools for increasing energy performance in the design stage. We strongly request that projects submit the Statement of Energy Design Intent generated by Target Finder and a detailed description of the proposed building to:

GGHC Research Project; Center for Maximum Potential Building Systems; 8604 FM 969, Austin, TX 78724.

(Note: while the GGHC process, including this point, is both voluntary and self-certifying, your submission of this data will greatly inform the process of improving future versions of this document.)

Reference Standards

EPA National Energy Performance Rating System, www.energystar.gov/benchmark

EPA Target Finder new design rating tool, www.energystar.gov/newbuildingdesign

ASHRAE Handbook, HVAC Applications, Chapter 7 Health Care Facilities, Specific Design Criteria, www.ashrae.org

ASHRAE/IESNA 90.1–2001 Energy Standard for Buildings, Except Low Rise Residential, www.ashrae.org

AIA Guidelines for Design and Construction of Health Care Facilities, 2001 Edition, www.aia.org

2003 Savings By Design Health Care Modeling Procedures, Pacific Gas and Electric Company, www.gghc.org/Documents/PGEModProc.pdf

Potential Technologies & Strategies

Design building systems to maximize energy performance while maintaining or improving health and safety requirements. Consider the following strategies as regionally appropriate:

Use energy (latent and sensible) recovery.

Ground source heat pumps.

Use evaporative cooling when ambient conditions allow.

Reduce outside airflow during unoccupied periods.

Expand unoccupied temperature dead band by automatically resetting zone temperature set points based on occupancy.

Separate HVAC zones with constant airflow, temperature and humidity control requirements from those with single or double shift occupancy that would allow reductions in air changes or setbacks in temperature and humidity.

Provide a cooling system with at least two cooling loops operated at different temperatures. This can be accomplished with separate chillers (or direct tower cooling).

Design for high part-load heating and cooling efficiency.

EA Prerequisite 2 continued

Minimum Energy Performance

Daylighting decreases energy costs for buildings by providing natural solar lighting. A well-designed daylit building is estimated to reduce lighting energy use by 50 to 80% and reduce the associated HVAC energy used to remove the heat of electric lighting from 10 to 20%. Overall power density can be reduced as much as 30%, resulting in lower capital costs for power and HVAC systems. Daylighting should be implemented in health care facilities with the special needs of the building occupants in mind.

Design high efficiency chiller plants that use various technologies and strategies to reduce overall plant energy consumption at full and part loads (such as chillers with variable speed drives on the compressors, primary-only variable flow pumping, series-counterflow chiller arrangements, etc.).

Use low leakage air handling units to reduce overall fan horsepower while ensuring that air is properly filtered.

Use a computer simulation model to assess the energy performance and identify the most cost effective energy efficiency measures. Quantify whole building energy performance as compared to a baseline building and to an annual energy performance target, if available.

Required

EA Prerequisite 3 CFC Reduction in HVAC&R Equipment

Intent

Reduce ozone depletion.

Health Issues

Stratospheric ozone layer depletion leads to increased exposure to ultraviolet radiation, increasing risk factors for skin cancer and immune system depression. The United States is one of the world's largest emitters of ozone depleting substances. As part of the US commitment to implementing the Montreal Protocol, the EPA has implemented regulations relative to the responsible management of CFCs, including programs to end the production of ozone depleting substances.

Credit Goals

- Zero use of CFC-based refrigerants in new base building HVAC&R systems. When reusing existing base building HVAC equipment that currently uses CFC refrigerants, create and implement a comprehensive CFC phase-out plan.

Documentation

- Document that the building's HVAC&R systems do not use CFC based refrigerants.
- For existing buildings, compile a listing of all existing HVAC&R components and state whether each component uses CFCs. For those components that use CFCs, prepare a phase out plan describing how these components will be converted or removed and replaced with CFC-free components before construction is complete.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

When reusing existing HVAC systems, conduct an inventory to identify equipment that uses CFC refrigerants and adopt a replacement schedule for these refrigerants. For new buildings, specify new HVAC equipment that uses no CFC refrigerants.

Resources

EPA, Stratospheric Ozone Protection: Moving to Alternative Refrigerants
<http://es.epa.gov/program/epaorgs/oar/altrefrg.html>.

8 points

EA Credit 1
Optimize Energy Performance

Intent

To achieve increasing levels of energy performance to reduce environmental impacts associated with excessive energy use.

Health Issues

Lower building energy use results in reduced combustion of fossil fuels for source energy generation. Energy efficiency benefits health by reducing emissions from the products of combustion, including less particulates and pollutants, which in turn help to improve outdoor air quality. Greenhouse gas emissions, which contribute to global climate change, are also reduced.

Credit Goals

- Model anticipated building energy performance using DOE2.1E or Energy Plus in accordance with the instructions provided in Prerequisite 2.
- For buildings that are not exempt from local energy codes, compare performance of the proposed building systems with the baseline building systems in accordance with ASHRAE 90.1-2004 Appendix G.
- For buildings that are exempt from all or portions of the local energy code, compare performance of the proposed building systems with the baseline building systems as described in Prerequisite 2.
- This credit may not be appropriate for small renovations that do not significantly affect the fundamental energy systems for the area. This credit can be applied to renovations that substantially alter the fundamental energy systems.

Point total	Exempt health care buildings	All other buildings
	Compared with baseline described in EA prerequisite 2	Compared to ASHRAE 90.1
Credit 1.1 (1 point)	Reduce design energy consumption by 5%	Reduce design energy cost by 10%
Credit 1.2 (2 points)	Reduce design energy consumption by 10%	Reduce design energy cost by 15%
Credit 1.3 (3 points)	Reduce design energy consumption by 15%	Reduce design energy cost by 20%
Credit 1.4 (4 points)	Reduce design energy consumption by 20%	Reduce design energy cost by 25%
Credit 1.5 (5 points)	Reduce design energy consumption by 25%	Reduce design energy cost by 30%
Credit 1.6 (6 points)	Reduce design energy consumption by 30%	Reduce design energy cost by 35%
Credit 1.7 (7 points)	Reduce design energy consumption by 35%	Reduce design energy cost by 40%
Credit 1.8 (8 points)	Reduce design energy consumption by 40%	Reduce design energy cost by 45%

EA Credit 1 continued

Optimize Energy Performance

Documentation

- Prepare a narrative documenting energy saving measures incorporated in the building design, including a table listing baseline and proposed comparisons of all model variables that are different.
- Prepare calculations verifying the building energy consumption performance achieved by the proposed energy conservation measures.
- Document anticipated whole building energy performance using the EPA's Target Finder design tool as described in EA Prerequisite 2.

Reference Standards

See EA Prerequisite 1.

Potential Technologies & Strategies

Design building systems to maximize energy performance while maintaining or improving health and safety requirements. Consider the following strategies as regionally appropriate:

- Use energy (latent and sensible) recovery.
- Use ground source heat pumps.
- Use evaporative cooling when ambient conditions allow.
- Reduce outside airflow during unoccupied periods.
- Expand unoccupied temperature dead band by automatically resetting zone temperature set points based on occupancy.
- Separate HVAC zones with constant airflow, temperature and humidity control requirements from those with single or double shift occupancy that would allow reductions in air changes or setbacks in temperature and humidity.
- Provide a cooling system with at least two cooling loops operated at different temperatures. This can be accomplished with separate chillers (or direct tower cooling).
- Design for high part-load heating and cooling efficiency.
- Design for daylighting to decrease energy costs for buildings by providing natural solar lighting. A well-designed daylit building is estimated to reduce lighting energy use by 50 to 80% and reduce the associated HVAC energy used to remove the heat of artificial lighting from 10 to 20%. Overall power density can be reduced as much as 30%, resulting in lower capital costs for power and HVAC systems. Daylighting should be implemented in health care facilities with the special needs of the building occupants in mind.
- Design high efficiency chiller plants that use various technologies and strategies to reduce overall plant energy consumption at full and part loads (such as chillers with variable speed drives on the compressors, primary-only variable flow pumping, series-counterflow chiller arrangements, etc.).
- Use low leakage air handling units to reduce overall fan horsepower while ensuring that air is properly filtered.

3 points

EA Credit 2
Renewable Energy

Intent

Encourage use of renewable energy technologies to reduce fossil fuel energy use.

Health Issues

Providing renewably-based on-site electricity to fulfill a portion of a building's energy needs offsets the greenhouse gas and particulate emissions associated with fossil-fuel electrical generation.

Credit Goals

Supply a net fraction of the building's total energy use (as expressed as a fraction of annual energy use) with on-site renewable energy systems.

Point total	Renewable energy provided as fraction of annual energy use
Credit 2.1 (1 point)	1% contribution
Credit 2.2 (2 points)	2% contribution
Credit 2.3 (3 points)	5% contribution

Documentation

- c1** Obtain calculations demonstrating that the required percentage of total energy use is supplied by renewable energy system(s).

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Assess the project for renewable energy potential including: solar (PV and active thermal), wind, geothermal, biomass (including biodiesel), hydro, and biogas strategies.

Note that ground source heat pumps do not count as geothermal, and that passive solar for domestic water or space heating is included under EA Credit 1 for Optimize Energy Performance.

When applying these strategies, take advantage of "net metering" with the local utility.

1 point

EA Credit 3
Additional Commissioning

Intent

Verify and ensure that the entire building is designed, constructed and calibrated to operate as intended.

Health Issues

Commissioning verifies the efficient and effective operations of a building's mechanical systems, thus ensuring compliance with indoor air quality and thermal comfort design criteria, and lessening dependence on natural resources resulting in improved outdoor air quality and reduced greenhouse gas emissions.

Credit Goals

In addition to the Fundamental Building Commissioning prerequisite (EA Prerequisite 1), implement or have a contract in place to implement the following additional commissioning tasks:

- Contract with a commissioning authority independent of the design team to review:
 - The design prior to the construction document phase.
 - The construction documents near completion of the construction document development and prior to issuing the contract documents for construction.
 - The contractor submittals relative to systems being commissioned.
- Provide the Owner with a single manual that contains the information required for re-commissioning building systems.
- Have a contract in place to review building operation with O&M staff, including a plan for resolution of outstanding commissioning-related issues within one year after construction completion date.

Documentation

- Document that the required additional commissioning tasks have been successfully executed or will be provided under existing contracts.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

EA Prerequisite 1 establishes the framework of an effective commissioning program. The Additional Commissioning credit ensures peer review through independent, third party verification. Engage the commissioning authority early in the design phase. The three design credit goals must be executed by a firm that is not on the design team (an "independent" Commissioning Authority). This requirement acts to avoid conflicts of interests and bias. It is recommended that the same independent Commissioning Authority deliver the two re-commissioning tasks, although it is not required. Hospitals and health care systems with in-house expertise in design and commissioning may perform this work. However, this is extremely specialized expertise and the owner may benefit from engaging a credentialed Commissioning Authority.

1 point

EA Credit 4
Refrigerant Selection

Intent

Reduce ozone depletion and global climate change effects through the proper selection of refrigerants for use in chillers.

Health Issues

Use of halocarbons in refrigerants in HVAC equipment has direct impact on stratospheric ozone layer depletion, which increases exposure to ultraviolet radiation, a risk factor for skin cancer. These refrigerants also have an indirect effect in energy use and the production of greenhouse gases and increased global climate change.

Credit Goals

- Install base building level HVAC and refrigeration equipment with combined low ozone depletion and global warming potential.

Documentation

- Document that HVAC&R systems use refrigerants that meet the credit goals for leakage, ozone depletion and global warming potential as described in this credit.

Reference Standards

Select a refrigerant that complies with the following equation where the terms are ozone depletion potential (*ODP* – expressed as equivalent pounds of refrigerant CFC11 per year); global warming potential (*GWP* – pounds of carbon dioxide produced per year); annual refrigerant leakage rate (*Lr* – % of charge lost per year); end of life loss (*Mr* – % of total charge); refrigerant charge (*Rc* – pounds of refrigerant per ton of cooling); and equipment life (*Life* – in years).

$$\frac{Rc \times ((Lr \times Life) + Mr)}{Life} \leq \frac{100}{GWP + (100,000 \times ODP)}$$

Manufacturers' and suppliers' data must be supplied to document values of *Lr*, *Mr*, *Life*, and *Rc*. Values for *ODP* and *GWP* for typical refrigerants are provided in the table below.

Potential Technologies & Strategies

When renovating or adding on to existing buildings, inventory existing building HVAC systems to be reused and replace those system components that contain refrigerants that do not meet the credit goals. For new buildings, specify refrigeration systems that comply.

For instance, a 15-year life air conditioning unit that uses HCFC-22 must have extremely low leakage rates (*Lr* = 1% and *Mr* = 2%) and a very low refrigerant charge (1.5 pounds per ton) to meet the credit goal.

EA Credit 4 continued
Refrigerant Selection

Values for ODP and GWP for typical refrigerants						
Refrigerant	ODP	GWP	Lr	Mr	Life (yr)	Rc (lb/ton)
CFC-11	1	4,600	1 to 3%	2 to 10%	20 to 35	2.0 to 2.4
CFC-12	0.82	10,600	1 to 3%	2 to 10%	20 to 35	2.5 to 3.0
CFC-114	0.94	9,800	1 to 3%	2 to 10%	20 to 35	1.4 to 3.3
CFC-500	0.605	7,900	1 to 3%	2 to 10%	20 to 35	1.4 to 3.3
CFC-502	0.221	4,600	1 to 3%	2 to 10%	20 to 35	1.4 to 3.3
HCFC-22	0.04	1,700	1 to 3%	2 to 10%	20 to 35	0.4 to 5.0
HCFC-123	0.02	120	1 to 3%	2 to 10%	20 to 35	1.4 to 3.3
HFC-23	0	11,700	1 to 3%	2 to 10%	20 to 35	1.4 to 3.3
HFC-125	0	2,800	1 to 3%	2 to 10%	20 to 35	1.4 to 3.3
HFC-134a	0	1,300	1 to 3%	2 to 10%	20 to 35	1.4 to 3.3
HFC-143a	0	3,800	1 to 3%	2 to 10%	20 to 35	1.4 to 3.3
HFC-227ea	0	2,900	1 to 3%	2 to 10%	20 to 35	1.4 to 3.3
HFC-236fa	0	6,300	1 to 3%	2 to 10%	20 to 35	1.4 to 3.3
HFC-245fa	0	950	1 to 3%	2 to 10%	20 to 35	1.4 to 3.3
HFC-404A	0	3,900	1 to 3%	2 to 10%	20 to 35	1.4 to 3.3
HFC-407C	0	1,700	1 to 3%	2 to 10%	20 to 35	1.4 to 3.3
HFC-410A	0	1,890	1 to 3%	2 to 10%	20 to 35	1.6 to 3.5
HFC-507A	0	3,900	1 to 3%	2 to 10%	20 to 35	1.4 to 3.3

Please note that the leakage rates, life and charge are suggested ranges. Please consult with manufacturers and suppliers to provide actual certified values.

Resources

Green Building Rating System for New Construction and Major Renovations (LEED-NC) Version 2.1, revised ed, 75 pp., Washington, DC: U.S. Green Building Council,

http://www.usgbc.org/Docs/LEEDdocs/LEED_RS_v2-1.pdf, 2003.

"Class I ozone-depleting substances," <http://www.epa.gov/ozone/ods.html>, 2002.

"Class II ozone-depleting substances," <http://www.epa.gov/ozone/ods2.html>, 2002.

"Global warming potentials of ODS substitutes," <http://www.epa.gov/ozone/geninfo/gwps.html>, 2002.

EA Credit 4 continued

Refrigerant Selection

Inventory of U.S. Greenhouse Gas Emissions and Sinks, 291 pp., Washington, DC: EPA 430-R-04-003, 2004

<http://yosemite.epa.gov/oar/globalwarming.nsf/content/ResourceCenterPublicationsGHGEmissions.html>.

United Nations Environmental Program, "UNEP Report of the Montreal Protocol Refrigeration, Air Conditioning and Heat Pumps Technical Option Committee," 2002.

United Nations Environmental Program, "Report of the TEAP Chiller Task Force (on CFC chillers and incentives/impediments to their replacement)," 2004.

J. Calm, "Comparative global warming impacts of electric vapor-compression and direct-fired absorption equipment," Electric Power Research Institute, Pleasant Hill, CA, EPRI 19TR-103297, 1993.

"Data maintained in the tracking system for compliance with the Montreal Protocol," Environmental Protection Agency, Global Programs Division, Washington, DC 2003.

Carbon Dioxide Emissions from the Generation of Electric Power in the United States, 21 pp., Washington, DC: Department of Energy and Environmental Protection Agency, 2000,

http://www.eia.doe.gov/cneaf/electricity/page/co2_report/co2emiss.pdf.

P. Domanski, D. Didion, and J. Chi, "CYCLE D: NIST vapor compression cycle design program," National Institute of Standards and Technology, Gaithersburg, MD, NIST Standard Reference Database 49, version 2.0, 1999.

M. McLinden and S. Klein, "NIST thermodynamic and transport properties of refrigerants," National Institute of Standards and Technology, Gaithersburg, MD, NIST Standard Reference Database 23, 1998.

1 point

EA Credit 5
Measurement & Verification

Intent

Provide for the ongoing accountability and optimization of building energy consumption performance over time.

Health Issues

Optimizing energy consumption reduces dependence on natural resources, contributing to healthy ecosystems and reducing the particulate and greenhouse gas emissions associated with fossil-fuel generated electricity.

Credit Goals

- Provide for long term continuous measurement of substantive energy uses within the facility (i.e. electrical loads greater than 100 KVA).
- At a minimum, provide metering for the following electrical and mechanical systems (as applicable to the scope of the project):
 - Lighting system power and controls
 - Motor loads (including air compressors, vacuum pumps and boiler systems)
 - Chillers
 - Data Centers
 - Critical Equipment Electrical Distribution Systems
 - Air distribution systems

Documentation

- q** Prepare a Measurement & Verification Plan.
- q** Include a summary schedule of the instrumentation and controls for the required monitoring categories, highlighting the I/O data points to be collected.
- q** Document the monitoring system, including cut sheets of sensors and the data collection system.

Reference Standards

International Performance Measurement and Verification Protocol Volume 1, 2001 Version
<http://www.ipmvp.org/>.

Potential Technologies & Strategies

Model the energy systems to predict savings. Design the building with equipment to measure whole building energy performance. Draft a Measurement and Verification Plan to apply during building operation that compares predicted savings to those actually achieved in the field. Submeter electric systems. Use measured system data to analyze the performance of electrically driven equipment and systems (such as chiller performance at part loads, and operational profiles of variable flow fan and pump systems).

4 points

EA Credit 6 Energy Supply Efficiency

Intent

Reduce the total non-renewable source energy required for the facility through increased energy supply efficiency.

Health Issues

Optimizing non-renewable energy consumption reduces dependence on natural resources, contributing to healthy ecosystems and reducing the particulate and greenhouse gas emissions associated with fossil-fuel generated electricity.

Credit Goals

- Calculate the total annual non-renewable source energy requirements for the facility as designed, using the calculated site energy requirements and the source conversion values provided in the table below. Calculate the percentage reduction in the total annual non-renewable source energy, achieved through the use of combined heat and power systems, or other methods of cascading energy recovery of primary fuel supplies (commonly known as “cogeneration”).

Source conversion values	
Fuel Type	Source kBTU per Site kBtu
Electricity	3.013
Natural gas	1.024
Fuel oil	1
Steam	1.38
Hot Water	1

Local air emissions regulations must be met. This credit cannot be applied for fuel switching without the use of energy generation equipment.

Point total	Percentage reduction in annual non renewable source energy
Credit 6.1 (1 point)	Reduce source energy use by at least 10%
Credit 6.2 (2 points)	Reduce source energy use by at least 15%
Credit 6.3 (3 points)	Reduce source energy use by at least 17%
Credit 6.4 (4 points)	Reduce source energy use by at least 18%

Documentation

- Obtain verification from the responsible engineering design professional of the reduction through a chart showing the fuel calculations listed in the requirements as set forth in Federal Energy Regulatory Commission (FERC) 18 CFR 292 for certification of qualifying cogeneration facilities.

Reference Standards

Federal Energy Regulatory Commission (FERC) 18 CFR 292 on Qualifying Cogeneration and Small Power Production Facilities under Public Utility Regulatory Policies Act Of 1978 (PURPA) www.ferc.gov/docs-filing/hard-filing/form-556/part292.asp.

Potential Technologies & Strategies

Increased supply efficiency, such as through cascading heat use/recovery, leads to higher overall supply efficiency. An example is heat recovered from electricity generation to generate hot or cold thermal distribution fluids.

1 point

EA Credit 7 Medical Equipment Efficiency

Intent

Reduce energy consumption by using efficient medical and other equipment.

Health Issues

Energy efficiency benefits health by reducing particulate and greenhouse gas emissions associated with fossil-fuel based electrical generation, thereby improving outdoor air quality and curbing global climate change potential.

Credit Goals

- Use Energy Star® qualified equipment or equipment in the top 25th percentile for energy consumption for that class of equipment for at least 75% (quantity, not cost) of the new medical equipment that is not building systems related.

Documentation

- c1** Compile a listing of all medical equipment purchased and calculations demonstrating that the threshold percentage of Energy Star-qualified products is achieved.
- c1** Where Energy Star-qualified equipment is not yet available for an application, demonstrate reasonable effort to meet the 25th percentile criterion by identifying a minimum of three other equivalent models that meet the functional needs of the facility with higher energy consumption requirements. If there are less than three other functionally equivalent models available on the market, use the most efficient available.

Reference Standards

EPA's Energy Star® Program at <http://www.energystar.gov>.

Potential Technologies & Strategies

Purchase computers, related electronics, and office equipment that carry the Energy Star® label. Examples of these include:

- Computers, Monitors Printers & Scanners
- Copiers
- DVD Products
- Exit Signs
- Refrigerators and Freezers
- TVs & VCRs
- Water Coolers

This is just a sampling of a steadily increasing list. Refer to EPA's Energy Star® Program at www.energystar.gov for an up to date list of product categories and models: http://www.energystar.gov/index.cfm?fuseaction=find_a_product.

Investigate availability of Energy Star® qualified products for medical equipment purchases, particularly those items that are purchased or leased in quantity or represent particularly high electric consumption. Do market survey for best 25 percent equipment where not yet available with Energy Star® labeling. Examples of the most important high load medical equipment to focus upon include:

- Diagnostic imaging equipment (x-rays, MRIs, etc)
- Sterilization
- Physiological monitoring
- Laundry
- Dietary

GGHC Appendix 1

Design Assumptions & Procedures for Modeling for the GGHC Energy Credits

The following design assumptions that differ from the requirements of ASHRAE 90.1-2004 Appendix G shall be used:

- Lighting levels – area category lighting power density values shall be as described in Table L-1 below. Use area categories from Table L-1 in combination with any valid area category from ASHRAE-90.1
- Indoor Design Conditions: in accordance with 1999 ASHRAE Handbook, HVAC Applications, Chapter 7 Health Care Facilities, Specific Design Criteria, or the requirements of the local jurisdiction, whichever is more stringent.
- Ventilation, air changes and air pressure relationships: Use specific ventilation rates, air changes, and pressure relationships, as required by authorities having jurisdiction. If the authorities having jurisdiction have no specific requirements, use the requirements from 2001 AIA Guidelines for Design and Construction of Hospital and Health Care Facilities, or most recent version..
- Baseline Building HVAC Systems: The requirements of ASHRAE 90.1-2004, Appendix G, Section G4.2 shall be modified as follows: If the proposed building systems are Constant Air Volume or Variable Air Volume with devices to maintain pressure relationships at all times, the HVAC systems in the baseline building design shall be Constant Volume Systems with hot water (not electric) reheat. If the proposed building systems are Variable Air Volume without pressure tracking devices, then the HVAC systems in the baseline building design shall be Variable Air Volume with hot water (not electric) reheat.
- Plug Loads: See Occupancy Assumptions below.
- Process Ventilation loads: Special ventilation requirements in a health care facility are not unusual. While Tables OCC-1 quantifies the typical ventilation in a health care facility, spaces may occur that require higher ventilation rates. The higher ventilation rates shall be simulated in both the Baseline and Proposed building simulation runs, making this an energy neutral feature.
- Process Fan Loads: Any energy consumed by fans that are solely related to process uses (such as EtO exhaust and kitchen hood exhaust), where the fan does not run 24 hours per day, may be excluded from the analysis.
- Occupancy Assumptions: Table OCC-1 lists the default values that shall be used in both the Baseline and Proposed building simulations. Should the user choose to use a different value for any of these assumptions (except for the lighting baseline), based upon professional judgment, the same value will be used in both the Baseline and Proposed building simulations.
- Lighting Controls and Daylighting: Table D-1 below shows factors that may be used to reduce lighting power densities calculated by the area category method to account for the various lighting control strategies listed. Factors shall be used to reduce the calculated LPD by multiplying the LPD for the area affected by the relevant strategy by the sum of 1 minus the factor listed. This corrected area LPD can then be used in the area/category calculations.
- Occupancy Schedules: In accordance with ASHRAE 90.1-2004 guidelines.

Table D-1 Lighting Power Savings Adjustments

TYPE OF CONTROL	TYPE OF SPACE	FACTOR		
Occupant sensor With separate sensor for each space	Any space <250 square feet enclosed by opaque floor-to-ceiling partitions; any size classroom, corridor, conference or waiting room	0.20		
	Rooms of any size that are used exclusively for storage	0.60		
	Greater than <250 square feet	0.10		
Dimming system Manual	Hotels/motels, restaurants, auditoriums, theaters	0.10		
	Multiscene programmable	0.20		
Tuning	Any space	0.10		
Automatic time switch control device	<250 square feet and with a timed manual override at each switch location required by §131 (a), and controlling only the lights in the area enclosed by ceiling-height partitions.	0.05		
Combined controls Occupant sensor with programmable multiscene dimming system	Hotels/motels, restaurants, auditoriums, theaters	0.35		
	Occupant sensor with a separate sensor for each space used in conjunction with daylighting controls and separate sensor for each space	Any space <250 square feet within a daylit area and enclosed by opaque floor-to-ceiling partitions	0.10 (may be added to daylighting control credit)	
Automatic Daylighting Controls (Stepped/Dimming)				
WINDOWS Window Wall Ratio				
Glazing Type	20%	20% to 40%	40%	
VLT > 60%	0.20/0.30	0.30 / .040	0.40/0.40	
VLT > 35 and < 60%	0/0	0.20/0.30	0.30/0.40	
VLT < 35%	0/0	0/0	0.20/0.40	
SKYLIGHTS Percentage of Gross Exterior Roof Area				
Glazing Type	< 1%	1% to 3%	>3%	
VLT > 60%	0/0.30	0.15/0.40	0.30/0.40	
VLT > 35 and < 60%	0/0.20	0/0.30	0.15/0.40	
VLT < 35%	0/0.10	0/0.20	0/0.30	

Notes for Table D-1:

1. From 2001 California Energy Efficiency Standards Non-residential Manual, August 2001, Table 5-10.

Table OCC-1 Area Occupancy Assumptions

Space Function	Occupant Density⁽¹⁾ (people / 1000 ft²)	Sensible (Btu/h / person)	Latent (Btu/h / person)	Receptacle Power⁽¹⁾ (W/ft²)	Service Water Heating⁽¹⁾ (Btu/h- person)	Lighting Power Density⁽²⁾ (W/ft²)	Minimum O.A. ⁽³⁾ (CFM/ft²)	Operatin g Schedule ⁽¹⁾ (Table
Anesthesia Storage	5	250	213	1.00	0	3.0	1.20	H
Angiographic-All Other Types	5	250	213	1.00	600	3.0	0.30	H
Angiographic-Heart Only	5	250	213	1.00	600	3.0	0.75	H
Autopsy	5	250	213	1.00	600	1.2	0.30	H
Bathroom/ Public	3.3	250	250	0.10	0	0.6	0.15	H
Bedpan Room	5	250	213	0.10	600	0.5	0.15	H
Cast Room	5	250	213	1.00	600	3.0	0.30	H
Clean Linen Storage	1	250	250	0.10	0	0.5	0.30	H
Clean Utility / Workroom	5	250	213	2.00	215	1.2	0.30	H
Conference Rooms	20	245	155	0.10	150	1.2	0.50	H
Corridors	10	250	250	0.10	0	0.6	0.30	H
Cystoscopy	5	250	213	1.00	600	3.0	0.75	H
Darkroom	5	250	213	1.00	600	0.3	0.30	H
Decontamination	5	250	213	1.00	600	1.2	0.30	H
Delivery Room	5	250	213	1.00	1000	4.5	0.75	H
Dietary Day Storage	2	250	250	0.10	0	0.5	0.30	H
Dining Room	10	275	275	0.10	300	1.1	1.50	B
Dishwashing	5	275	475	1.00	215	1.7	0.30	H
Endoscopy	5	250	213	1.00	600	3.0	0.30	H
Histology	5	150	213	1.00	600	4.5	0.30	H
Isolation	5	250	213	1.00	300	0.5	0.30	H
Janitors Closet / Utility	1	250	250	0.10	0	0.5	1.50	H
Kitchen, Food Preparation	5	275	475	1.00	400	1.7	0.30	B
Labor/ Delivery/Recovery	5	250	213	1.00	1000	4.5	0.30	H
L / D / R / Post Partum	5	250	213	1.00	1000	0.7	0.30	H
Laboratory	5	250	213	1.00	600	3.0	0.30	H
Linen Storage, Clean	2	250	250	0.10	0	0.5	0.30	H
Lobby	10	250	250	0.10	100	1.1	0.15	H
Lockers	10	250	250	0.25	0	0.7	0.15	H
Mammography	5	250	213	1.00	600	3.0	0.30	H
Mechanical Equipment Room	0.5	250	250	0.10	0	0.7	0.15	H
Medical Records	2	250	250	0.10	0	3.0	0.15	H
Nuclear Medicine, Hot Lab	5	250	213	1.00	600	1.2	0.30	H
Nursery, General	5	250	213	1.00	300	3.0	0.45	H
Nursery, Exam	5	250	213	1.00	300	0.7	0.45	H
Nursing Stations- General	5	250	213	0.25	150	1.2	0.15	H
Operating Room	5	250	213	1.00	1000	4.5	0.75	H
Pathology	5	250	213	1.00	600	3.0	0.30	H
Patient Room	5	245	155	1.00	300	0.5	0.30	H
Pharmacy / Medicine Room	5	250	213	1.00	150	3.0	0.30	H
Physical Therapy and Hydrotherapy	5	250	213	1.00	150	1.2	0.30	C
Recovery	5	250	213	1.00	300	3.0	0.30	H
Scrub Up Area, Surgical Corridor	5	250	213	1.00	1000	4.5	0.30	H
Soiled Linen, Sorting	5	250	213	1.00	600	1.2	1.50	H
Special Procedure Room, Diagnostic	5	250	213	1.00	600	3.0	0.30	H
Special Procedure Room, Invasive	5	250	213	1.00	600	3.0	0.75	H
Stairways	1	250	213	0.10	0	0.6	0.15	H
Sterilizer Room	5	250	213	1.00	600	1.2	1.50	H
Sub-Sterile	5	250	213	1.00	600	0.7	0.30	H

Space Function	Occupant Density ⁽¹⁾ (people / 1000 ft ²)	Sensible (Btu/h / person)	Latent (Btu/h / person)	Receptacle Power ⁽¹⁾ (W/ft ²)	Service Water Heating ⁽¹⁾ (Btu/h-person)	Lighting Power Density ⁽²⁾ (W/ft ²)	Minimum O.A. ⁽³⁾ (CFM/ft ²)	Operating Schedule ⁽¹⁾ (Table 7.1.2)
Surgical Supply	5	250	213	1.00	0	1.2	0.30	H
Trash Chute Room	0.5	250	250	0.10	0	0.5	1.50	H
Trauma	5	250	213	1.00	600	3.0	0.75	H
Treatment / Examination	5	250	213	1.00	300	1.2	0.30	C
Unsterile Supply	2	250	250	1.00	0	0.5	0.30	H
Waiting Areas/Lounges	10	250	250	0.10	0	1.1	0.15	H
X-ray, Diagnostic and Treatment	5	250	213	1.00	600	3.0	0.30	H

Notes for Table OCC-1

- (1) From ASHRAE/IESNA 90.1-2001 ECB Supplement Tables 7.1A & 7.1B
- (2) See Table L-1
- (3) From 1998 California Mechanical Code when listed, otherwise from California ACM Manual Table 2-2.

Table L-1 Area Category Method

Baseline Lighting Power Density Values(watts/sf) by Primary Function For Hospital / Healthcare				
Anesthesia Storage	3.0		Lockers	0.7
Angiographic-All Other Types	3.0		Mammography	3.0
Angiographic-Heart Only	3.0		Mechanical Equipment Room	0.7
Autopsy	1.2		Medical Records	3.0
Bathroom	0.6		Nuclear Medicine, Hot Lab	1.2
Bedpan Room	0.5		Nursery, Exam	3.0
Cast Room	3.0		Nursery, General	0.7
Clean Linen Storage	0.5		Nursing Stations	0.7
Clean Utility / Workroom	1.2		Operating Room	4.5
Conference Rooms	1.2		Pathology	3.0
Corridors	0.6		Patient Room	0.5
Cystoscopy	3.0		Pharmacy / Medicine Room	3.0
Darkroom	0.3		Physical Therapy and Hydrotherapy	1.2
Decontamination	1.2		Recovery	3.0
Delivery Room	4.5		Scrub Up Area, Surgical Corridor	4.5
Dietary Day Storage	0.5		Soiled Linen, Sorting	1.2
Dining Room	1.1		Special Procedure Room, Diagnostic	3.0
Dishwashing	1.7		Special Procedure Room, Invasive	3.0
Endoscopy	3.0		Stairways	0.6
Histology	4.5		Sterilizer Room	1.2
Isolation	0.5		Sub-Sterile	0.7
Janitors Closet / Utility	0.5		Surgical Supply	1.2
Kitchen, Food Preparation	1.7		Trash Chute Room	0.5
Labor/Delivery/Recovery	4.5		Trauma	3.0
L / D / R / Post Partum	0.7		Treatment / Examination	1.2
Laboratory	3.0		Unsterile Supply	0.5
Linen Storage, Clean	0.5		Waiting Areas/Lounges	1.1
Lobby	1.1		X-ray. Diagnostic and Treatment	3.0
<i>From Pacific Gas & Electric's 2003 Savings By Design Healthcare Modeling Procedures</i>				

Process Loads Procedures:

- Remove the process load energy consumption calculated in the model used to demonstrate that the proposed building performance meets the ASHRAE 90.1-2004 Energy Cost Budget.
- Add in the process loads. Create an estimate of whole building process load usage or use the area category method, selecting load densities from Table P-1 below. Multiply the load density for an area by the operating hours per year for that area, and sum up all the areas to obtain the annual process energy consumption to be added to the modeling results for the HVAC, lighting, and service water heating energy consumption.
- Process Fan Loads: Add in an estimate of process fan loads.

Table P-1 Process Load Densities

Space Function	Process Equipment Average Watts/sf	Process Steam Average W/sf
Imaging Department or area	8	0
Emergency Department	3	0
Full-Service Kitchen	2	5
Surgical Suite	3	0
Radiation Therapy (linear accelerator and simulator room)	15	0
ICU/CCU	1	0
Nursing Units	1/2	0
Central Sterile	5	0
Cath Labs	5	0
Laundry	1/2	10
Labs	3	0

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Materials & Resources

Required

MR Prerequisite 1

Storage and Collection of Recyclables

Intent

Reduce solid waste disposal in landfills and incinerators generated by health care facilities through reduction, reuse, recycling and composting.

Health Issues

A 1998 Memorandum of Understanding between the U.S. EPA and the American Hospital Association targeted a 33% reduction in solid waste to landfill or incineration by 2005; 50% by 2010. As hospitals develop environmentally preferable purchasing standards and implement recycling programs to achieve this goal, the spatial and programming implications associated with these goals must be considered. More than 50% of a hospital's waste stream is composed of the materials addressed in this credit. Diverting a building's operational waste stream constituents from landfilling and incineration reduces the need to extract virgin natural resources, saves energy, reduces emissions associated with new production and transportation, and reduces potential groundwater contamination from landfills and toxic air emissions from incineration.

Credit Goals

- Establish a collection system and controlled areas serving the entire building dedicated to the separation, storage, and collection of materials for recycling including (at a minimum) newsprint, paper, corrugated cardboard, glass, plastics, metals, fluorescent lamps (tube, compact fluorescent and HID) and batteries.

Documentation

- Compile a Waste Management Plan, highlighting the types and volumes of waste generated and identifying those that can be handled by the recycling program.
- Compile a Functional Program showing the area(s) dedicated to recyclable material collection and storage. Demonstrate that the area(s) dedicated to recycling are controlled and that both the controlled areas and collection system are appropriately sized to accommodate the building users' recycling needs.

Reference Standards

There is no reference standard for this prerequisite.

The American Hospital Association (AHA) and the United States Environmental Protection Agency (EPA) signed a Memorandum of Understanding (MOU) identifying goals to reduce the impact of health care facilities on the environment. A primary goal is the reduction of the health care solid waste stream. <http://www.h2e-online.org/about/mou.htm>.

Other credits relevant to the AHA/EPA MOU include MR Prerequisite 2 (Mercury Elimination), MR Credits 2.1 & 2.2 (Construction Waste Management) and MR Credit 8.2 PBT Elimination: Mercury Use in Equipment).

MR Prerequisite 1 continued

Storage and Collection of Recyclables

Potential Technologies & Strategies

The Waste Management Plan should stipulate the categories and volumes of waste for recycling. The functional program should include the space requirements associated with the waste management plan, and include centralized recycling collection and storage spaces. Determine size of spaces based upon volume of projected waste and length of anticipated storage. At loading docks or other waste removal areas, include space for compactors and balers for recycling cardboard waste. Staging areas for sharps containers and recycling containers must be included to facilitate efficient operation of the recycling program. Secure storage should be provided for fluorescent lamps and batteries to minimize risk of mercury contamination.

Resources

Healthy Hospitals: Environmental Improvements through Environmental Accounting, Tellus Institute, Boston, MA under US EPA Cooperative Agreement X 821580-01-0, 2000.

Memorandum of Understanding between the American Hospital Association and the U.S. EPA, kEPA-742-F-99-018, <http://www.h2e-online.org/about/mou.htm>.

National Recycling Coalition www.nrc-recycle.org.

For space programming data, see the following resources:

California Integrated Waste Management Board www.ciwmb.ca.gov.

US EPA, Business Guide for Reducing Solid Waste - Volume To Weight Conversion Table appendices http://yosemite.epa.gov/R10/OWCM.NSF/recycle/vol_wght.

Architectural Graphic Standards, 10th Edition, pp.942-43.

Required

MR Prerequisite 2**Mercury Elimination****Intent**

Eliminate stand alone mercury-containing building products and reduce mercury discharge through product substitution and capture.

Health Issues

In 1998, a Memorandum of Understanding between the American Hospital Association and the US EPA set new goals for hospital pollution prevention. One of the top priorities was the virtual elimination of mercury and mercury-containing devices from the hospital waste stream by the year 2005. Mercury is a potent neurotoxin. The most sensitive health effect of mercury is an adverse impact on the neurological development of fetuses, infants and children. Low-level prenatal exposure can result in language, memory and attention deficits in children who were exposed in-utero. Hospitals have substantially reduced the purchase of mercury containing chemicals and medical devices and found substitutes for many pharmaceuticals. To achieve virtual elimination of mercury from the waste stream, however, requires the phasing out and recycling of mercury containing building products, such as thermostats, switches, batteries, and lamps, for mercury recovery.

Credit Goals

- Eliminate specification and use of thermostats, switches and other stand-alone mercury containing measurement devices in building control systems.
- Specify and install low mercury fluorescent tubes and compact fluorescent lamps, and low mercury high intensity discharge bulbs such that average mercury content in fluorescent tubes and compact fluorescent lamps does not exceed 5 mg of mercury, and that high-intensity discharge lamps have the lowest available mercury content, providing that all other performance specifications are met.
- Demolition plans shall include a plan for capture of historical mercury sources, including but not limited to piping infrastructure. Collection of any mercury devices shall be designated for recycling and preclude overseas donation/disposal.
- In facilities delivering dental care, install amalgam separation devices.

Documentation

- q Document that the facility is free of mercury containing devices (excepting lamps and any devices mandated by Federal law), and that any dental facilities have installed amalgam separators that meet or exceed the standard ISO-11143.
- q Compile a copy of the Waste Management Plan highlighting the types of mercury containing devices in use that are handled by the recycling program and disposal methods for captured mercury. Include dental wastes, including scrap amalgam, chair side traps, and separator wastes.
- q Compile a demolition plan which requires collection of all mercury containing switches, devices and fluorescent lamps to ensure their safe storage and recycling, and include a construction protocol for the management of historical mercury sources and/or spills.

MR Prerequisite 2 continued

Mercury Elimination

- q Maintain purchasing records and technical data on lamps associated with initial occupancy verifying that the average mercury concentration for all fluorescent tubes and compact fluorescent lamps does not exceed 5 mg.
- q Verify that high-intensity discharge lamps are purchased with the lowest mercury content, providing that all other performance specifications are met.

Reference Standards

[The American Hospital Association \(AHA\) and the United States Environmental Protection Agency \(EPA\) signed a Memorandum of Understanding identifying goals to reduce the impact of health care facilities on the environment. A primary goal included the virtual elimination of mercury waste from the health care waste stream by the year 2005. <http://www.h2e-online.org/about/mou.htm>](http://www.h2e-online.org/about/mou.htm)

Other credits relevant to the AHA/EPA MOU include MR Prerequisite 1 (Storage and Collection of Recyclables), MR Credits 2.1 & 2.2 (Construction Waste Management) and MR Credit 8.2 PBT Elimination: Mercury Use in Equipment).

A variety of state laws prohibiting some or all uses of mercury-containing building products have been enacted. These include but are not limited to:

- Maine State law (LD 1159) prohibits the sale of mercury in switches, measuring devices (including sphygmomanometers), instruments and thermostats.
- Washington State law (House Bill 1002) requires the labeling of fluorescent lamps that contain mercury. Prohibits the sale of mercury-containing items in products such as thermometers and thermostats.
- Connecticut State law (House Bill 5539) bans the sale and distribution of mercury fever thermometers and places restrictions on the sale of other mercury-containing equipment.
- California State law (SB 633) restricts the use and distribution of mercury fever thermometers and other uses.
- Oregon State law (HB 3007) phases out mercury thermostats and prohibits the sale of fever thermometers and other uses.

Potential Technologies & Strategies

Advances in lighting technology have greatly reduced the per lamp mercury concentrations. Low mercury, high intensity discharge lamps are increasingly available. Consider long life, low mercury lamps to reduce costs associated with relamping, recycling and purchase. Very low mercury fluorescent induction lighting, with instant on-off control, offering reduced energy usage and long life.

1 point

MR Credit 1.1**Building Reuse: Maintain 40% of Existing Walls, Floors and Roof****Intent**

Extend the life cycle of existing building stock, conserve resources, retain cultural resources, reduce waste and reduce environmental impacts of new buildings as they relate to manufacturing and transport of the materials.

Health Issues

Current health care facility construction represents more than 100 million square feet annually, valued at approximately \$18 billion of completed construction, with renovations and expansions representing a significant percentage. The extraction of raw materials used in the construction of new buildings represents significant natural resource extraction with the potential for ecological disruption, while fossil fuel and chemical emissions associated with materials' processing and product manufacturing and transportation can result in exposures harmful to human health.

In addition, building reuse reduces the amount of solid waste leaving the project site. Construction and demolition debris accounts for more than 30% of municipal solid waste.

Credit Goals

- Use existing structure (including structural floor and roof decking) and envelope (exterior skin and framing, excluding window assemblies and non-structural roofing material) to comprise at least 40% of completed building (including additions).

Documentation

- q Calculate the total area of existing exterior envelope (not including windows) and existing building structure to ensure that the credit goals have been met.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Consider reuse of existing buildings, including structure, envelope and interior non-structural elements. Remove elements that pose contamination risk to building occupants and upgrade inefficient components such as windows, mechanical systems and plumbing fixtures.

Use only areas (sf) to calculate the quantity of preserved materials. The area to be used in the denominator is the sum of all (1) floor and roof area, including the ground floor to account for slabs-on-grade and footings, and (2) the exterior wall area, excluding window assemblies. The area to be used in the numerator is the sum of reused floor, roof, and wall area, excluding window assemblies.

1 point in addition to MR 1.1

MR Credit 1.2**Building Reuse: Maintain 80% of Existing Walls, Floors and Roof****Intent**

Extend the life cycle of existing building stock, conserve resources, retain cultural resources, reduce waste and reduce environmental impacts of new buildings as they relate to manufacturing and transport of the materials.

Health Issues

Current health care facility construction represents more than 100 million square feet annually, valued at approximately \$18 billion of completed construction, with renovations and expansions representing a significant percentage. The extraction of raw materials used in the construction of new buildings represents significant natural resource extraction with the potential for ecological disruption, while fossil fuel and chemical emissions associated with materials' processing and product manufacturing and transportation can result in exposures harmful to human health.

In addition, building reuse reduces the amount of solid waste leaving the project site. Construction and demolition debris accounts for more than 30% of municipal solid waste.

Credit Goals

- Use existing structure and envelope (exterior skin and framing, excluding window assemblies and non-structural roofing material) in an additional 40% (80% total) of existing building structure and shell (exterior skin and framing, excluding window assemblies and non-structural roofing material).

Documentation

- q Calculate the total area of envelope skin (not including windows) and existing building structure to ensure that the credit goals have been met.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Consider reuse of existing buildings, including structure, envelope and interior non-structural elements. Remove elements that pose contamination risk to building occupants and upgrade inefficient components such as windows, mechanical systems and plumbing fixtures.

Use only areas (sf) to calculate the quantity of preserved materials. The area to be used in the denominator is the sum of all (1) floor and roof area, including the ground floor to account for slabs-on-grade and footings, and (2) the exterior wall area, excluding window assemblies. The area to be used in the numerator is the sum of reused floor, roof, and wall area, excluding window assemblies.

1 point

MR Credit 1.3**Building Reuse: Maintain 50% of Interior Non-Structural Elements****Intent**

Extend the life cycle of existing building stock, conserve resources, retain cultural resources, reduce waste and reduce environmental impacts of new buildings as they relate to manufacturing and transport of the materials.

Health Issues

Current health care facility construction represents more than 100 million square feet annually, valued at approximately \$18 billion of completed construction, with renovations and expansions representing a significant percentage. The extraction of raw materials used in the construction of new buildings represents significant natural resource extraction with the potential for ecological disruption, while fossil fuel and chemical emissions associated with materials' processing and product manufacturing and transportation can result in exposures harmful to human health.

In addition, building reuse reduces the amount of solid waste leaving the project site. Construction and demolition debris accounts for more than 30% of municipal solid waste.

Credit Goals

- Reuse existing non-shell elements (interior walls, doors, floor coverings, and ceiling systems) in at least 50% of completed building (including additions).

Documentation

- q Calculate the total area of exterior skin (not including windows) and existing building structure and related interior non-shell items to ensure that the credit goals have been met.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Consider reuse of existing buildings, including structure, shell and non-shell elements. Remove elements that pose contamination risk to building occupants and upgrade inefficient components such as windows, mechanical systems and plumbing fixtures.

2 points

MR Credit 2.1 & 2.2**Construction Waste Management: Divert 50% from Landfill & Incineration****Intent**

Divert construction and demolition debris from disposal in landfills and incinerators. Redirect recyclable recovered resources back to the manufacturing process. Redirect reusable materials to appropriate sites.

Health Issues

The US EPA estimates that more than 30% of municipal solid waste is generated by construction and demolition activities. Typical construction projects generate approximately 2.2 pounds of waste per square foot, which equates to over 110 thousand tons of construction waste annually based on current rates of over 100 million square feet of annual average health care construction. A 1998 study by the New York State Department of Health found that women living near solid waste landfills have a four-fold increased chance of bladder cancer or leukemia, based on data from 38 landfills, while a 1989 study by the U.S. EPA found elevated cancers of the bladder, lung, stomach and rectum in counties with the highest concentration of waste sites. Municipal solid waste incinerators emit hydrocarbons, heavy metals, dioxins and furans, acid gases, sulfur dioxide, nitrogen oxides and particulates, exposure to each of which pose risks to human health. Diversion of construction and demolition (C&D) debris through salvaging and recycling extends the life of existing landfills and reduces demand for virgin resources thereby curbing unhealthy air and water emissions resulting from manufacturing with virgin feedstocks and from landfill and incineration operations.

Credit Goals

- Develop and implement a waste management plan in accordance with Triangle J Council of Government's Waste Spec: Waste Specifications for Construction Waste Reduction, Reuse and Recycling, quantifying material diversion goals.
- Define process for surveying and assessing hazardous materials in the existing building, including PCBs, mercury, lead and asbestos. Mercury is a material that may require special remediation attention in the renovation or demolition of an existing health care facility as significant quantities of mercury can accumulate in places such as traps, light fixtures and ceiling and inter-floor spaces from medical equipment breakage over the years, providing an unanticipated significant hazard to construction and demolition crews.
- Quantify materials goals relative to the following diversion methods:
 - Salvaged materials: List materials to be salvaged for reuse in the project in the construction documents. Identify haulers and recipients for salvaged materials and products that will not be reused in the project. List materials that may be economically feasible for salvage.
 - Recycling: Identify haulers and sources for materials recycling. Provide containers for those products that will be sorted either on- or off-site for recycling. Identify reclaimers who recover construction and demolition scrap of their products for recycling. List materials that are eligible for reclamation, including carpets and ceiling tiles.
 - Packaging: Identify manufacturers who reclaim their packaging for reuse or recycling. Identify options for reduced packaging.

MR Credit 2.1 & 2.2 continued

Construction Waste Management: **Divert 50% from Landfill & Incineration**

- Hazardous materials: Develop procedures for separating hazardous waste by-products of construction (including paints, solvents, oils and lubricants) and for disposing of those wastes according to appropriate federal, state, or local regulations.
 - Prevent loss of soil during construction by stormwater runoff and/or wind erosion, including protecting topsoil by stockpiling for reuse.
 - Prevent sedimentation of storm sewer or receiving streams.
 - Prevent polluting the air with dust and particulate matter.
- Lead Radiation Protection construction components. Pay particular attention to lead in C&D debris, often used as components of Radiation Protection Systems. Separate sheet lead radiation protection and lead lined gypsum board products, lead-lined doors and frames for reuse, salvage or reprocessing. Salvage for reuse or reprocessing all lead-lined glazing products.
- **Credit 2.1 (1 credit)** Recycle and/or salvage at least 50% of construction and demolition debris, not including hazardous waste. Calculations can be done by weight or volume, but must be consistent throughout.
- **Credit 2.2 (1 credit)** Recycle and/or salvage an additional 25% (75% total) of construction and demolition debris. Calculations can be done by weight or volume, but must be consistent throughout.

Documentation

- Compile a Waste Management Plan tabulating the total waste materials, quantities diverted and the means by which diverted. Compare this to calculations of total C&D waste generated by the project.

Reference Standards

Waste Spec: Waste Specifications for Construction Waste Reduction, Reuse and Recycling, Triangle J Council of Governments, July, 1995, www.tjco.gov/dst.nc.us/cdwaste.htm.

California Integrated Waste Management Board. A Technical Manual of Material Choices in Sustainable Construction, Chapter 9 and Appendix C, July, 2000, <http://www.ciwmb.ca.gov>.

Potential Technologies & Strategies

Establish goals for landfill diversion and adopt a construction waste management plan to achieve these goals. Consider recycling cardboard, metal, brick, concrete, plastic, clean wood, glass, gypsum wallboard, carpet and insulation. Designate a specific area on the construction site appropriate for either on-site or off-site sorting of materials. Record efforts throughout the construction process. Identify construction haulers and recyclers to handle the designated materials. Depending on project soil conditions, consider using unpainted gypsum board waste as a soil amendment. While not contributing to this credit's diversion percentage, on- or off-site beneficial reuse of land clearing debris is also encouraged. Note that salvage may include donation of materials to charitable organizations such as Habitat for Humanity.

MR Credit 2.1 & 2.2 continued

Construction Waste Management: **Divert 50% from Landfill & Incineration**

Resources

Recycling and Waste Management During Construction, City of Seattle,
www.metrokc.gov/procure/green/wastemgt.htm.

Construction and Demolition Waste Recycling Information, California Integrated Waste Management Board (CIWMB),
www.ciwmb.ca.gov/ConDemo/Materials/.

Construction Waste Management Database, US Government Services Administration (GSA),
<http://www.wbdg.org/ccbref/cwm.php>. Free online service for those seeking companies that recycle construction debris in their area.

1 point

MR Credit 2.3**Construction Practices: Site & Materials Management****Intent**

Implement site and materials management practices during construction to minimize adverse impacts on adjacent occupants.

Health Issues

Health care construction rarely occurs on undeveloped sites remote from ongoing existing operations. In many instances, construction operations are proximate to existing operational health care facilities, where construction practices have health impacts on adjacent building occupants and building system performance. Careful attention to minimize construction-related health and environmental adverse impacts enhances the high performance building objectives and the health of adjacent occupants.

Credit Goals

- Develop and implement a Construction Practices Environmental Management System (EMS) for the construction and pre-occupancy phases of the building. The below listed “best practices” are strategies the contractor could employ as part of the EMS depending on the size, scope and circumstances of the project.
- Site Utilization:
 - Compile a site access plan to minimize site disruption associated with the project's construction phase. Plan temporary construction facilities, designated staging areas, access roads and construction parking within new building and paving footprints to minimize site disturbance.
 - Establish measures to protect priority sensitive areas of the site, including prohibiting staging, stockpiling and soil compaction. Prevent disturbance to natural resources, protected wetlands and endangered species.
- Temporary Facilities:
 - Utilize salvaged or refurbished materials for construction of temporary facilities, but avoid reuse of pressure treated lumber or lumber with lead paint. Note that while most production of CCA (copper chromium arsenate) pressure treated wood was phased out in the US after Dec. 31, 2003, except for specialty markets such as highways and marine applications, there are no restrictions on continued sale of stockpiled or recycled CCA products after this date. Avoid use of lumber treated with arsenic and chromium.
 - Make all temporary facilities weathertight.
- Delivery, Storage and Handling:
 - Coordinate delivery with scheduled installation date to minimize packaging, handling and storage time at site. Use resource reduction and recycling procedures outlined in ASTM D5834.
 - Store materials in clean, dry location. Protect from soiling, abuse, moisture and microbial growth.
 - Handle and store fuels to prevent spills and discharges into waterways.
 - Store fuels, solvents and other sources of VOCs separately from absorbent materials.
 - Implement practices for proper disposal of waste materials; i.e. concrete truck wash out, tool cleaning, painter clean-up, waste oils from pipe cutting, to prevent discharges into sanitary and stormwater facilities.

MR Credit 2.3 continued

Construction Practices: **Site & Materials Management**

- Construction Site Housekeeping and Particulates Control - Exterior. Establish a constructor's policy and document implementation of the following:
 - Control particulate discharge resulting from sandblasting operations.
 - Use water sprinkling to control dust generation.
- Environmental Manager: Designate an on-site party responsible for overseeing the environmental goals for the project and implementing procedures for environmental protection.
- Environmental Training Program: Provide environmental training for personnel performing work on the project site. Include as a minimum:
 - Overview of environmental issues related to the building industry.
 - Overview of environmental issues related to the Project.
 - Review site specific procedures and management plans, including GGHC SS Prerequisite 1, MR Credits 2.1, 2.2, 2.3, EQ Credits 3.1, 3.2, and 4.6.

Documentation

- Document that a Construction Practices Environmental Management System (EMS) was implemented for the project. Include evidence of compliance with the plan during the construction period.

Reference Standards

Reference Standard: ANSI A10.34-2001, Protection of the Public on or Adjacent to Construction Sites.

MR Credit 2.3 continued

Construction Practices: **Site & Materials Management**

Potential Technologies & Strategies

Demands are increasing from both private and public owners that contractors provide high-performance, environmentally friendly construction. An Environmental Management System (EMS) serves as a management tool to continually improve all operations that impact the environment including regulatory compliance. It identifies goals and enlists the entire workforce in a coordinated effort to achieve them. A well-implemented plan reaps both short term and long term benefits, which soon pays for itself by:

- Helping a company meet its environmental obligations and avoiding fines for noncompliance.
- Saving costs through process improvements: reducing material inputs, waste disposal costs, reporting costs, and risk of liability.
- Maintaining a company's competitiveness in its markets, and helping to solicit new business from owners specifying high performance, green construction.
- Retaining valuable employees by improving employee morale.
- Boosting public image and relations with regulatory agencies.
- Bringing public recognition by the federal government and some states. An EMS is one of the main criteria for participation in US EPA's National Performance Track Program.

Resources

Environmental Management Systems Guidelines, New South Wales Construction Policy Steering Committee, November 1998. This initiative is aimed at providing a systematic approach to the management of the environmental impacts of the construction industry within the context of the principles of Ecologically Sustainable Development.

US EPA's National Performance Track Program, www.epa.gov/performance-track.

1 point

MR Credit 2.4**Construction Practices: Utility & Emissions Control****Intent**

Reduce air and noise pollution from fossil fueled vehicle and construction equipment use during the construction process. Implement conservation and efficiency practices for temporary utilities.

Health Issues

Health care construction rarely occurs on undeveloped sites remote from ongoing existing operations. In many instances, construction operations are proximate to existing operational health care facilities, where construction practices may have health impacts on adjacent building occupants and building system performance. Managing of construction practices enhances high performance building objectives and minimizes adverse impacts on adjacent occupants.

Construction vehicle emissions and particulate air pollution associated with operation of construction equipment impacts air quality in and around adjacent buildings. Construction vehicles are often operating in areas remote from routine ongoing vehicular operation, which may put them near outdoor air intakes and operable windows. Noise from construction equipment, even within daytime working hours, can be particularly disruptive to therapeutic recovery and healing processes. Currently, the only diesel fuel regulated by EPA is that which is intended for use in highway engines. Specifically, diesel fuel sold for use in most non-road applications such as construction equipment has sulfur on the order of 3,300 parts per million (ppm). In comparison, current standards for fuel used in highway diesel engines limit sulfur concentrations to a maximum of 500 ppm, and the new 2007 rule will drop the cap even lower to 15 ppm in 2006. The sulfur content of diesel fuel is directly related to health risks associated with fuel combustion.

Credit Goals

- Develop and implement a plan to reduce utility, vehicle and other energy-related pollution during the construction phase. Include as a minimum the following:
- Temporary Utilities: Efficiencies and conservation.
 - Temporary lighting & power: Use energy efficient fluorescent and other efficient lighting and controls in lieu of incandescent lighting; control light pollution. Shut off temporary lighting after work hours or 30 minutes after sunset (whichever occurs last) except for stairways and other emergency access and security needs, either by manual or automatic setback means.
 - Temporary water: Meter water usage. Use hoses with trigger nozzles. Control runoff preventing pollutants from entering storm sewer system; prevent ponding and creation of mosquito habitat.
 - Temporary heating & cooling: Use high efficiency equipment. Maintain weathertight enclosures to reduce heat loss.
- Engine use: Efficiencies and conservation.
 - Use alternative fueled vehicles for on-road construction vehicles to provide 50% of the project's vehicular transportation needs (as measured by total mileage logged).
 - Reduce air emissions from construction equipment and other non-road diesel engines by utilizing low-sulfur diesel fuel or biodiesel, or converting to natural gas powered engines.
 - Reduce noise emissions from construction equipment and other non-road engines, by utilizing equipment that meets the Blue Angel Criteria for Low-noise Construction Machinery RAL-UZ 53 as equipment is available that meets or exceeds performance requirements.

MR Credit 2.4 continued

Construction Practices: Utility & Emissions Control

- Use electric powered cranes, compressors and other equipment as appropriate in lieu of combustion engine powered equipment.
- Demonstrate efforts to establish carpooling or alternative transportation program for full time on-site construction personnel.

Documentation

- q Document the site carpooling program components, with annual summaries, indicating that the carpooling program has been developed and implemented throughout the entire construction period.
- q Document cranes and compressor equipment types for the construction period.
- q Document proof of ownership of, or 2 year lease agreement for, alternative fuel vehicles and calculations indicating that alternative fuel vehicles comprise 50% of contractor operated vehicle fleet, in terms of miles driven per year. Document fleet total annual mileage as well as total annual mileage driven by alternative fuel fleet vehicles.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Use alternative fueled on-road construction vehicles, low-sulfur diesel fuel or biodiesel, electric powered cranes, compressors and other equipment and develop carpooling or alternative transportation programs.

Resources

Basic Criteria for the Award of the Environmental Label: Low-noise Construction Machinery RAL-UZ 53, Blue Angel, Sankt Augustin, Germany.

http://www.blauer-engel.de/englisch/produkte_zeichenanwender/vergabegrundlagen/ral.php?id=81

2 points

MR Credit 3**Resource Reuse****Intent**

Reuse building materials and products in order to reduce demand for virgin materials and to reduce waste, thereby reducing impacts associated with the extraction and processing of virgin resources.

Health Issues

Resource reuse eliminates primary extraction of virgin resources and manufacturing, thus preventing associated ecosystem disruption, energy expenditure and toxic emissions, while diverting materials from disposal.

Credit Goals

- **Credit 3.1** (1 point) Specify salvaged, refurbished or reused materials, products and furnishings for a minimum of 5% of the total value of all building materials and products used in the project.
- **Credit 3.2** (1 point) Specify salvaged, refurbished or reused materials, products and furnishings for at least another 5% (total 10% or greater) of the total value of all building materials and products used in the project.

Documentation

- Compile calculations listing each material or product used to meet this credit. Include tabulation demonstrating that the project incorporates the required percentage of reused materials and products and showing their costs and the total cost of materials for the project.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Identify opportunities to incorporate salvaged materials into building design and research potential material suppliers. Consider salvaged materials such as beams and posts, flooring, paneling, doors and frames, metal casework, brick and decorative items.

Salvaged materials that are sourced within 300 miles (1000 miles if shipped by rail or water) of the project site may also qualify for the regional materials credits (MR Credit 5.1 and 5.2). However, while reuse of existing buildings may incorporate salvaged materials, salvaged materials cannot be applied to MR Credit 1 (Building Reuse) or MR Credit 4 (Recycled Content).

2 points

MR Credit 4**Recycled Content****Intent**

Increase demand for building products that incorporate recycled content materials, thereby reducing impacts resulting from extraction and processing of virgin materials.

Health Issues

Recycled content materials have the potential to conserve non-renewable resources, lower embodied energy, reduce ecological disruption and air, land and water emissions associated with extracting, transporting, and processing raw materials and manufacturing, and lower global warming potential. As a singular defining element of enhanced environmental performance, recycled content alone may not achieve optimal ecological health benefits as there may be toxic emissions and high energy use associated with reprocessing and manufacturing using recycled-content feedstocks.

Credit Goals

- **Credit 4.1** (1 point) Specify materials with recycled content such that the sum of post-consumer recycled content plus 1/2 the post-industrial recycled content constitutes at least 10% of the total monetary value of the materials in the project.
- **Credit 4.2** (1 point) Use materials with recycled content such that the sum of post-consumer recycled content plus 1/2 the post-industrial recycled content constitutes at least an additional 10% (total 20% or greater) of the total monetary value of the materials in the project.
- Determine the value of the recycled content portion of a material or furnishing by dividing the weight of recycled content in the item by the total weight of all material in the item, then multiplying the resulting percentage by the total value of the item.
- Acceptable recycled-content cements used as substitutes for Portland cement include:
 - Fly ash generated as a coal combustion by-product, only with documentation that the coal plant was not co-fired with hazardous waste, medical waste, or tire-derived fuel and with verified mercury content ≤ 2 ppb (current drinking water standard for mercury).
 - Ground granulated blast furnace slag as a by-product of pig iron production only with documentation that the plant was not co-fired with hazardous waste, medical waste, or tire-derived fuel.
 - Rice husk ash.

Fly ash generated from municipal solid waste incinerators is not an acceptable recycled-content material under this credit.

Mechanical and electrical components are not included in this calculation. Recycled content materials are defined in accordance with the Federal Trade Commission document, Guides for the Use of Environmental Marketing Claims, 16 CFR 260.7 (e).

Documentation

- c** Compile documentation listing the recycled content products used. Include calculations demonstrating that the project incorporates the required percentage of recycled content materials and products and showing their cost and percentage(s) of post-consumer and/or post-industrial content, and the total cost of all materials for the project.

MR Credit 4 continued

Recycled Content

Reference Standards

Guides for the Use of Environmental Marketing Claims, 16 CFR 260.7 (e), Federal Trade Commission www.ftc.gov/bcp/grnrule/guides980427.htm.

ASTM E2129-01 Standard Practice for Data Collection for Sustainability Assessment of Building Products.

Potential Technologies & Strategies

Establish a project goal for recycled content materials and identify material suppliers that can contribute to this goal. During construction, ensure that the specified recycled content materials are procured and installed and quantify the total percentage of recycled content materials installed. Third party certification can be useful to assure validity of recycling claims. While mechanical and electrical components are not included in this calculation, specification of products with recycled content is encouraged where available for electrical equipment, such as light fixtures housing, electrical raceways and mechanical products such as air ducts, diffusers and return grilles.

Seek to incorporate products into the building design that not only have recycled content but are also recyclable, reusable or compostable at their end of life in the building.

Given the importance of health issues to these facilities, it is recommended that candidate materials be screened for compliance with the various indoor air quality goals established in EQ Credit 4 as appropriate.

1 point

MR Credit 5**Regional Materials Extracted and Manufactured Regionally****Intent**

Increase demand for building materials and products that are extracted and manufactured within the region, thereby supporting the use of indigenous resources and reducing the environmental impacts resulting from transportation.

Health Issues

The use of regional building materials may avoid local and remote human health impacts that result from transportation activities and the resulting pollution associated with delivery of materials and products to the project site.

Credit Goals

- **Credit 5.1** (1 point):
 - Specify building materials that are extracted, harvested or recovered, then processed and manufactured within a radius of 300 miles for a minimum of 10% of the total value of all building materials and products used in the project.

OR

- Specify building materials that are extracted, harvested or recovered, then processed and manufactured and shipped primarily by rail or water within a radius of 1,000 miles for a minimum of 10% of the total value of all building materials and products used in the project.

OR

- Specify a minimum of 10% of building materials that reflects a combination of the above extraction, harvesting, recovering, processing, manufacturing and shipping criteria (e.g., 5% within 300 miles and 5% shipped by rail within 1,000 miles).
- **Credit 5.2** (1 point): Specify an additional 10% (total 20%) of building materials that meet the above criteria.

Documentation

- q Prepare calculations demonstrating that the project incorporates the required percentage of regional materials and products and showing their cost, percentage of regional components, transportation service, distance from project to furthest site of extraction or manufacture, and the total cost of all materials for the project.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Establish a project goal for regionally manufactured materials and identify materials and material suppliers that can contribute to achievement of this goal. Create and maintain a database of regional manufacturers. During construction, ensure that the specified regional materials are installed.

Given the importance of health issues to these facilities, it is recommended that candidate materials be screened for compliance with the various indoor air quality goals established in EQ Credit 4 as appropriate.

1 point

MR Credit 6**Rapidly Renewable Materials: 5%****Intent**

Reduce the use and depletion of finite raw materials and long-cycle renewable materials by replacing them with rapidly renewable materials.

Health Issues

Rapidly renewable materials generally yield more material from less acreage, have lower irrigation and pesticide requirements, and do not result in significant biodiversity loss providing they are grown in accordance with sustainable agricultural or forestry practices. These practices prevent pollution of water and land resources and help to maintain healthy ecosystems.

Credit Goals

- Specify rapidly renewable building materials and products primarily made from rapidly renewable resources for a minimum of 5% of the total value of all building materials and products used in the project. Rapidly renewable resources are those materials that substantially replenish themselves faster than traditional extraction demand (i.e., planted and harvested within a ten-year cycle).

Documentation

- ❑ Prepare calculations demonstrating that the project incorporates the required percentage of rapidly renewable materials and products. Show their cost and percentage of rapidly renewable components, and the total cost of all materials for the project.
- ❑ Obtain documentation from the manufacturer, declaring the rapidly renewable materials contained in the candidate products.

Reference Standards

While recognized certification standards for non-timber forest products and agricultural products used as building materials and products are not yet implemented, both the Forest Stewardship Council and the Smartwood organization have standards in development.

Potential Technologies & Strategies

Establish a project goal for rapidly renewable materials and identify materials and products that can achieve this goal. Consider materials such as bamboo flooring, wool carpet, straw and wheat board, sunflower seed board, cotton batt insulation, linoleum flooring, poplar OSB, and others. Seek materials from producers using low impact sustainable agricultural practices to avoid eutrophication and soil depletion. Watch for emerging sustainable harvest certification systems for rapidly renewable materials.

1 point

MR Credit 7
Certified Wood**Intent**

Encourage environmentally responsible forest management.

Health Issues

Human and environmental health is inextricably linked with forest health. Sustainable forestry protects water quality by reducing water and soil runoff and pesticide and herbicide use. Specifying and procuring certified sustainably harvested wood increases acreage using sustainable management practices. These practices also protect aquatic life, including threatened and endangered species, and maintain viable diverse plant life increasing air filtration and carbon dioxide sequestration. The balancing of carbon dioxide mitigates global climate change, and thereby reduces the spread and redistribution of disease that can be a consequence of climate change.

Credit Goals

- Specify products certified in accordance with the Forest Stewardship Council's Principles and Criteria for a minimum of 50% of the total value of all wood-based materials and products used in the project. This should include all wood building components including, but not limited to, structural framing and general dimensional framing, flooring, finishes, and furnishings.

Documentation

- q Prepare a spreadsheet highlighting the FSC-certified materials and products used. Include calculations demonstrating that the project incorporates the required percentage of FSC-certified materials and products and their cost together with the total cost of all materials for the project.
- q For each material or product used to meet these goals, document the vendor or manufacturer's Forest Stewardship Council chain-of-custody certificate number.

Reference Standards

ASTM D4840-99 Standard Guide for Sampling Chain-of-Custody Procedures.

Forest Stewardship Council Guidelines www.fscus.org.

Potential Technologies & Strategies

Establish a project goal for FSC-certified wood products and identify suppliers, with an emphasis on regionally supplied products, that can contribute to achieving this goal. Consider also seeking FSC-certified wood for non-rented temporary construction applications such as bracing, concrete form work and pedestrian barriers.

1 point

MR Credit 8.1**PBT Elimination: Dioxins****Intent**

Reduce the release of persistent bioaccumulative toxic chemicals (PBTs) associated with the life cycle of building materials.

Health Issues

PBTs are toxic chemicals of particular health concern because they do not break down quickly in the environment, they become widely distributed geographically and they bio-magnify or concentrate in the tissue of living organisms as they move up the food chain. With a few exceptions, the major source of human exposures to PBTs in the general population occurs from the consumption of contaminated food in the ordinary diet. These toxic chemicals cause a range of adverse wildlife and human health effects, including cancer, and developmental impacts in the nervous, reproductive, and immune systems. Immature, developing organisms are the most sensitive to exposures to PBTs.

Because of their toxicity, persistence, and bioaccumulative characteristics, even very small, difficult to detect releases can lead to harmful exposures. This has led to an emphasis on strategies targeting elimination of the production and use of PBT substances, or those that are known to lead to their formation, rather than attempts to control emissions.

Dioxin, addressed in this credit, is an extremely potent carcinogen and reproductive/developmental toxicant, with adverse impacts at extremely low levels of exposure.

Dioxin is one of at least five of the PBTs commonly addressed in PBT elimination policies that have direct links with building materials. Others include cadmium, mercury, lead, and PCBs (polychlorinated biphenyls). These PBTs are used in the manufacture of building materials or unavoidably produced and released into the environment during one or more stages of the material's life cycle. These credits are aimed at eliminating building materials typically used in construction that either contain one or more PBTs or are associated with PBT releases at one or more stages of their life cycle.

Some building materials are associated with substantial dioxin releases during their lifecycle that are directly related to the product content, hence making product selection a useful strategy for dioxin elimination. For example, the plastics that contain chlorine, such as PVC, and cement from kilns fired with hazardous waste are targeted by this credit because direct dioxin generation is associated with their manufacture as well as with many forms of disposal and accidental combustion of chlorine-containing materials in building fires or landfills. In addition, PVC feedstock production also creates several other target PBTs including PCBs (polychlorinated biphenyls), HCB (hexachlorobenzene), HCBd (hexachlorobutadiene) and octachloro-styrene (OCS). Materials that do not contain chlorine — such as polyolefins and other chlorine-free plastics — are not associated with these types of dioxin releases. It is recognized that any building material can be associated with dioxin releases in their life cycle due to reliance on diesel fuel combustion for transportation and coal combustion to provide power in the manufacturing process. These impacts are not intrinsically related to the material per se, so product selection cannot prevent them.

Other building materials that may have significant direct dioxin releases include aluminum, copper and lead (from smelting (recycling) operations), and iron (from sintering operations). Dioxin releases from copper recycling are dropping dramatically as chlorine sources, particularly PVC wire sheathing, are removed from the recycling stream. Lead is addressed directly in MR Credit 8.3. The others require more analysis to determine whether material avoidance is warranted.

MR Credit 8.1 continued

PBT Elimination: **Dioxins**

PBT elimination is reflected in policies established by a broad range of local, state, federal and international governmental bodies as well as major health care systems and organizations as reflected in the Resources section below.

Credit Goals

- Specify no use of cement from kilns fired with hazardous waste.

AND

- Specify no use of materials containing virgin or recycled chlorinated compounds including:
 - Chlorinated polyethylene (CPE)
 - Chlorinated polyvinyl chloride (CPVC)
 - Chlorosulfonated polyethylene (CSPE)
 - Neoprene
 - Polyvinyl chloride (PVC)
- In two (2) of the three (3) groups listed below:
- Group 1 - Exterior and Structural:
 - Roof membranes
 - Window and door frames
 - Siding
 - Other exterior finishes
 - Geomembranes
- Group 2 - Interior Finishes:
 - Flooring (minimum of 50% of total floor area)
 - Base
 - Ceiling tiles
 - Wall coverings
 - Window treatments
- Group 3 – Mechanical/Electrical Systems:
 - Piping
 - Conduit and boxes

Exception can be made for minor parts, such as tracks, gaskets, and other seals, as long as a chlorinated compound is not one of the primary materials of the frame or body of the product.

MR Credit 8.1 continued

PBT Elimination: Dioxins

Documentation

- q Compile documentation that all products and materials on interior and exterior finish, roof, window and door and piping schedules and concrete specifications meet the goals of this credit. Provide specification language identifying the dioxin reduction goal to the contractor for the aforementioned material categories and indicating that review of material content will be a criterion in all substitution reviews.

Reference Standards

PBT elimination is reflected in policies established by a broad range of local, state, federal and international governmental bodies as well as major health care systems and organizations:

The Stockholm Convention on Persistent Organic Pollutants, signed by EPA Administrator Christine Todd Whitman for the United States with officials from 90 other countries in May 2001, addresses dioxins and furans, PCBs and HCB and commits signatories “to reduce the total releases with the goal of their continuing minimization and, where feasible, ultimate elimination.” United Nations Environment Programme on Persistent Organic Chemicals, <http://www.chem.unep.ch/pops/> Stockholm Convention on Persistent Organic Pollutants <http://www.pops.int/>.

United Nations Environmental Program (UNEP) Mandate 22/4 on Mercury calls for national action to reduce or eliminate releases of mercury and its compounds. United Nations Environment Programme Mandate 22/4 on Mercury <http://www.chem.unep.ch/mercury/mandate-2003.htm>.

The Canada – U.S. International Joint Commission (IJC) study of PBTs in the Great Lakes led to a “Canada -- United States Strategy for the Virtual Elimination of Persistent Toxic Substances in the Great Lakes” signed in April of 1997 by both countries that include dioxins and furans, PCBs, HCB, HCBd, cadmium, lead and mercury. Great Lakes Binational Strategy, <http://www.epa.gov/glnpo/p2/bns.html>.

The U.S. Environmental Protection Agency (USEPA), in response to the Stockholm Convention, UNEP and IJC, has established a list of target PBTs including dioxins, PCBs, HCB, OCS, lead, and mercury. US EPA Strategy for Priority Persistent, Bioaccumulative and Toxic (PBT) Pollutants <http://www.epa.gov/opptintr/pbt/pbtstrat.htm>.

US EPA TRI PBT Chemical List, http://www.epa.gov/triinter/chemical/pbt_chem_list.htm.

Washington State’s Department of Ecology has established a list of 22 PBTs including dioxins, HCB, HCBd, cadmium, lead, and mercury that the Department has targeted to be virtually eliminated from Washington sources. Washington State PBT Strategy www.ecy.wa.gov/programs/eap/pbt/pbtfaq.html.

The cities of Seattle and San Francisco have both established plans to reduce PBT releases, including eliminating the use of PVC building materials. City of Seattle PBT Reduction Strategy <http://www.cityofseattle.net/environment/Documents/PBTStrategy3-07-03.pdf>.

A wide range of health care related organizations have passed resolutions directly encouraging action by member organizations to reduce dioxin releases or to reduce or eliminate the use of PVC due to its association with PBTs, including the American Public Health Association, American Nurses Association, California Medical Association, Chicago Medical Society and the Maine Hospital Association. Several major health care systems, including Kaiser Permanente and Catholic Healthcare West are acting to reduce their use of PVC and other PBT related materials from health care products and building materials. American Public Health Association resolution, “Prevention of Dioxin Generation from PVC Plastic Use by Health Care Facilities,”

<http://www.apha.org/legislative/policy/policysearch/index.cfm?fuseaction=view&id=125>.

MR Credit 8.1 continued

PBT Elimination: **Dioxins**

Health Care Without Harm listing of resolutions on PVC <http://www.noharm.org/pvcDehp/reducingPVC>.

The American Hospital Association (AHA) and the United States Environmental Protection Agency (EPA) signed a Memorandum of Understanding (MOU) identifying goals to reduce the impact of health care facilities on the environment. One goal of the MOU is to minimize the production of PBT pollutants. <http://www.h2e-online.org/about/mou.htm>.

Potential Technologies & Strategies

Establish a project goal for materials that meet the dioxin reduction emission goals and identify materials and suppliers to fulfill this goal.

The following list indicates where the specified chlorinated compounds are primarily used in building materials:

- Chlorinated polyethylene (CPE) – geomembranes, wire and cable jacketing
- Chlorinated polyvinyl chloride (CPVC) - water pipes
- Chlorosulfonated polyethylene (CSPE) – roof membranes, electrical connectors and sheet membrane for pond liners
- Neoprene - weather stripping, expansion joint filler, water seals, and other gaskets and adhesives
- Polyvinyl chloride (PVC) – pipes and conduit, waterproofing, siding, roof membranes, door and window frames, resilient flooring, carpet backing, wall covering, signage, window treatments, furniture, wire and cable sheathing
- While exception can be made for minor parts, specifiers are encouraged to seek EPDM and silicone or other non-chlorinated alternative seals and other minor parts where possible.

Consider materials that are not manufactured with chlorine or other halogens. Options include (but are not limited to) TPO, EPDM, and FPO for roof membranes; natural linoleum, rubber, or alternate polymers for flooring and surfacing; natural fibers, polyethylene, polyester and paint for wall covering; polyethylene for wiring; and wood, fiberglass, HDPE, and aluminum with thermal breaks for windows and copper, cast iron, steel, concrete, clay, polypropylene and HDPE for piping.

Substitutions consistent with this credit are also encouraged in furniture and wiring. In wiring substitution, also avoid other halogenated compounds (compounds containing chlorine, bromine or fluorine), most notably the fluoropolymers that have similar health concerns.

Resources

Dioxin formation and waste combustion continues to be studied by EPA and others. For reference, please consult (www.h2e-online.org/) for recent EPA findings on the subject.

Healthy Building Network, PVC Alternatives Database <http://www.healthybuilding.net/pvc/alternatives.html>.

1 point

MR Credit 8.2

PBT Elimination: **Mercury Use in Equipment****Intent**

Reduce the release of persistent bioaccumulative and toxic chemicals (PBTs) associated with the life cycle of building materials.

Health Issues

PBTs are toxic chemicals of particular health concern because they do not break down quickly in the environment, they become widely distributed geographically and they bio-magnify or concentrate in the tissue of living organisms as they move up the food chain. With a few exceptions, the major source of human exposures to PBTs in the general population occurs from the consumption of contaminated food in the ordinary diet. These toxic chemicals cause a range of adverse wildlife and human health effects, including cancer, and developmental impacts in the nervous, reproductive, and immune systems. Immature, developing organisms are the most sensitive to exposures to PBTs.

Because of their toxicity, persistence, and bioaccumulative characteristics, even very small, difficult to detect releases can lead to harmful exposures. This has led to an emphasis on strategies targeting elimination of the production and use of PBT substances, or those that are known to lead to their formation, rather than attempts to control emissions.

Mercury - addressed in this credit - is a potent neurotoxin. Prenatal exposure can result in deficits in language, memory and attention.

Mercury is one of at least five PBTs commonly addressed in PBT elimination policies that have direct links with building materials. Others include cadmium, lead, dioxins (including furans and dioxin like compounds) and PCBs (polychlorinated biphenyls). These PBTs are used in the manufacture of building materials or unavoidably produced and released into the environment during one or more stages of the material's life cycle. These credits are aimed at eliminating building materials typically used in construction that either contain one or more PBTs or are associated with PBT releases at one or more stages of their life cycle.

PBT elimination is reflected in policies established by a broad range of local, state, federal and international governmental bodies as well as major health care systems and organizations as reflected in the Resources section in MR Credit 8.1.

Credit Goals

- Specify HVAC systems, control systems, and other large electrical product and/or systems that are free of mercury switches (tilt, float, pressure and temperature) and mercury relays.
- Categories of equipment screened should include, but not be limited to:
 - HVAC systems
 - Control systems
 - Boiler systems
 - Pump and other fluid control systems

Note: this credit refers to switches and relays built in to equipment. External thermostats and other stand alone switches and control devices are addressed in MR Prerequisite 2.

MR Credit 8.2 continued

PBT Elimination: **Mercury Use in Equipment**

Documentation

- Compile documentation including mechanical schedules noting the mercury-free specifications.
- Prepare specification language identifying the mercury-free goal to the contractor for the aforementioned material categories and indicating that review of material content will be a criterion in all substitution reviews.

Reference Standards

The American Hospital Association (AHA) and the United States Environmental Protection Agency (EPA) signed a Memorandum of Understanding identifying goals to reduce the impact of health care facilities on the environment. A primary goal included the virtual elimination of mercury waste from the health care waste stream by the year 2005. <http://www.h2e-online.org/about/mou.htm>.

PBT elimination is reflected in policies established by a broad range of local, state, federal and international governmental bodies as well as major health care systems and organizations. Refer to the listing in MR Credit 8.1.

Maine State law (LD 1159) prohibits the sale of mercury in switches, measuring devices (including sphygmomanometers), instruments and thermostats.

See also Reference Standards in MR Prerequisite 2.

Potential Technologies & Strategies

Establish a project goal for mercury-free materials and identify materials and suppliers to fulfill this goal. Consider digital measurement devices and controls.

1 point

MR Credit 8.3**PBT Elimination: Lead & Cadmium****Intent**

Reduce the release of persistent bioaccumulative toxic chemicals (PBTs) associated with the life cycle of building materials.

Health Issues

PBTs are toxic chemicals of particular health concern because they do not break down quickly in the environment, they become widely distributed geographically and they bio-magnify or concentrate in the tissue of living organisms as they move up the food chain. With a few exceptions, the major source of human exposures to PBTs in the general population occurs from the consumption of contaminated food in the ordinary diet. These toxic chemicals cause a range of adverse wildlife and human health effects, including cancer, and developmental impacts in the nervous, reproductive, and immune systems. Immature, developing organisms are the most sensitive to exposures to PBTs.

Because of their toxicity, persistence, and bioaccumulative characteristics, even very small, difficult to detect releases can lead to harmful exposures. This has led to an emphasis on strategies targeting elimination of the production and use of PBT substances, or those that are known to lead to their formation, rather than attempts to control emissions.

Lead - addressed in this credit -- is a potent neurotoxin, particularly in the developing brain of fetuses and children, and can also cause kidney and reproductive system damage. Cadmium -- also addressed here -- is a carcinogen and causes kidney, lung, intestinal, and placental damage.

Lead and cadmium are two of at least five PBTs commonly addressed in PBT elimination policies that have direct links with building materials. Others include mercury, dioxins (including furans and dioxin like compounds) and PCBs (polychlorinated biphenyls). These PBTs are used in the manufacture of building materials or unavoidably produced and released into the environment during one or more stages of the material's life cycle. These credits are aimed at eliminating building materials typically used in construction that either contain one or more PBTs or are associated with PBT releases at one or more stages of their life cycle.

Credit Goals

- Specify substitutes for materials manufactured with lead and cadmium, when cost effective alternatives that meet or exceed performance standards are available, as follows:
 - Specify use of lead-free solder and roofing. Lead is typically found in roofing products in terne, copper roofing, and roof flashing.
 - Specify use of lead-free insulated jacketing of electrical wire and cable that meets or exceeds performance requirements.
 - Specify no use of interior or exterior paints containing cadmium or lead. Green Seal certified or recommended paints meeting Green Seal criteria exclude metals including cadmium, lead, mercury, antimony, and hexavalent chromium.

MR Credit 8.3 continued

PBT Elimination: **Lead and Cadmium**

Documentation

- q Prepare roofing, electrical wiring and painting schedules noting the lead- and cadmium-free specifications.
- q Prepare specification language identifying the lead- and cadmium-free goal to the contractor for the aforementioned material categories and indicating that review of material content will be a criterion in all substitution reviews.

Reference Standards

Green Seal GS-11 standard <http://www.green seal.org/standards/paints.htm>.

Green Seal certified products list, <http://www.green seal.org/certproducts.htm>.

Green Seal recommended paints <http://www.green seal.org>.

PBT elimination is reflected in policies established by a broad range of local, state, federal and international governmental bodies as well as major health care systems and organizations. Refer to the listing in MR Credit 8.1.

Potential Technologies & Strategies

Establish a project goal for lead- and cadmium-free products and identify products and suppliers to fulfill this goal. Consider products such as silver and other lead-free solder, solderless copper connectors and polyethylene piping, aluminum flashing and Green Seal compliant paints. Note that it is understood that there may be small allowable use of cadmium in equipment beyond the knowledge and access of the designer, such as relay contacts.

Consider lead-free alternate radiation shielding materials.

Note that some PVC products contain lead or cadmium as stabilizers. For example, lead remains the primary stabilizer in PVC insulation for electrical wire and cable, and cadmium and lead are both still found in PVC resilient flooring products. While not all PVC products contain lead or cadmium, specifying PVC-free products as per MR Credit 8.1 (Dioxin) will help ensure greater elimination of potential lead and cadmium sources.

1 point

MR Credit 9.1**Furniture and Medical Furnishings: Resource Reuse****Intent**

Reduce the environmental impacts from the manufacture, use and disposal of furniture and medical furnishings products.

Health Issues

Resource reuse eliminates primary extraction of virgin resources, transportation and manufacturing, thus preventing associated ecosystem disruption, energy expenditure and toxic emissions, while diverting materials from disposal.

Credit Goals

- Specify salvaged, refurbished, or used furniture and medical furnishings for a minimum 20% of the total furniture and medical furnishings budget.

Documentation

- c) Compile a list of furniture and medical furnishings, with the salvaged or reused components identified and indicate their replacement value to determine that the credit goals have been met for the requisite amount of furniture.

Potential Technologies & Strategies

Identify opportunities to salvage and reuse furniture from existing inventory and research potential used furniture suppliers. Consider salvaging and reusing systems furniture and furnishings such as case pieces, seating, filing systems, and medical furnishings such as exam tables, stools, carts, etc.

Furniture dealers are sources for reused furniture and furniture recycling programs at the local and regional levels. This helps save energy and other resources by reducing reshipping impacts and creation of new product using virgin material.

(Note: Hospital beds are excluded from this credit.)

1 point

MR Credit 9.2**Furniture and Medical Furnishings: Materials****Intent**

Reduce the environmental impacts from the manufacture, use and disposal of furniture and medical furnishings products.

Health Issues

The environmental and health issues surrounding materials used in the manufacture of furniture products parallel those outlined for building products in the Material and Resource credits. Significant health impacts are associated with the use of Persistent, Bioaccumulative and Toxic Chemicals (PBTs), chrome plated finishes, and wood harvesting for furniture products manufacture.

PBTs are toxic chemicals of particular health concern because they do not break down quickly in the environment, they become widely distributed geographically and they bio-magnify or concentrate in the tissue of living organisms as they move up the food chain. With a few exceptions, the major source of human exposures to PBTs in the general population occurs from the consumption of contaminated food in the ordinary diet. These toxic chemicals cause a range of adverse wildlife and human health effects, including cancer, and developmental impacts in the nervous, reproductive, and immune systems. Immature, developing organisms are the most sensitive to exposures to PBTs.

Because of their toxicity, persistence, and bioaccumulative characteristics, even very small, difficult to detect releases can lead to harmful exposures. This has led to an emphasis on strategies targeting elimination of the production and use of PBT substances, or those that are known to lead to their formation, rather than attempts to control emissions.

Hexavalent chromium is another particularly toxic chemical used in furniture for chrome plating. It poses a wide range of health impacts ranging from respiratory tract damage to cancer, particularly for workers and for residents surrounding manufacturing sites.

The furniture industry is a major market for wood products. Human and environmental health is inextricably linked with forest health. Sustainable forestry protects water quality by reducing water and soil runoff and pesticide and herbicide use. Specifying and procuring certified sustainably harvested wood increases acreage using sustainable management practices. These practices also protect aquatic life, including threatened and endangered species, and maintain viable diverse plant life increasing air filtration and carbon dioxide sequestration. The balancing of carbon dioxide mitigates global climate change, and thereby reduces the potential disease spread predicted to be a consequence of global warming induced climate change.

Credit Goals

- Specify 40% of furniture and medical furnishings by cost that complies with a minimum of two (2) of the following goals:
 - No PBTs in material manufacture - Mercury, Cadmium, Lead or chlorinated compounds (including PVC) in furniture components, textiles, finishes or dyes (per MR Credit 8).
 - No chrome plated finishes.
 - All wood components from FSC Certified Wood (per MR Credit 7).

MR Credit 9.2 continuedFurniture and Medical Furnishings: **Materials**

Documentation

- Prepare a matrix indicating the three goals and a listing of furniture, indicating that the requisite amount of furniture complies with a minimum of two out of the three listed goals.
- For each material or product used to meet the Certified Wood goal, document the vendor or manufacturer's Forest Stewardship Council chain-of-custody certificate number.

Potential Technologies & Strategies

Heavy metals, such as lead, cadmium, and mercury, can be found in PVC products, fabric dyes and leather tanning. Some manufacturers in the textile industry have eliminated heavy metals from the dyes used in upholstery, backing or barrier cloths, panel fabrics and window textiles. In addition, alternatives exist for PVC-free edging material, furniture connection pieces and panel base covers.

Specify furniture from manufacturers that offer FSC-certified wood products, with an emphasis on regionally supplied products that can contribute to achieving this goal.

1 point

MR Credit 9.3**Furniture and Medical Furnishings: Manufacturing, Transportation and Recycling****Intent**

Reduce the environmental impacts from the manufacture, use and disposal of furniture and medical furnishings products.

Health Issues

The use of regional assembly practices reduces transportation activities and the resulting pollution associated with delivery of furniture products to the project site. Reducing or eliminating packaging, and/or ensuring that the packaging is recyclable or compostable, results in a lessened reliance on disposal. Similarly, the end of life recycling of furniture products reduces solid waste volumes by diverting materials from disposal and reduces the need for continued extraction and raw manufacturing. In both cases, unhealthful air, water, and land pollution associated with landfill and incineration can be reduced.

Credit Goals

Specify 40% of furniture and medical furnishings based on cost that complies with a minimum of two (2) of the following goals:

- Locally and/or regionally assembled – Furniture and medical furnishings that are assembled within 300 miles of the project if transported primarily by truck or 1000 miles if shipped primarily by rail or water.
- Transported with a minimum of packaging - Reduce, reuse, recycle, compost or minimize packaging for shipping, and packaging that is “taken back” by manufacturer for reuse (such as blanket wrapping).
- Has “end of life” destination – is designed for disassembly, recyclability, biodegradability, or is part of a “take back” program. Furniture that can be disassembled or recycled at end of life, either locally or by the manufacturer through a “take back” program, qualifies.

Documentation

- q Prepare a matrix indicating the three goals and a listing of furniture and medical furnishings and their associated costs, indicating that the requisite amount of furniture complies with a minimum of two out of the three listed goals.

Potential Technologies & Strategies

Specify furniture products that are assembled within 300/1000 miles of the project site, depending on mode of transport, to reduce environmental impacts from transportation and support the regional economy.

Minimize packaging and reuse or return packaging to the sender for recycling. Manufacturers are using cardboard with recycled content. Soy inks should be substituted for inks made with heavy metals. Encourage shippers to blanket wrap bulky items, such as chairs, if going directly to the end user. Blankets and pallets are reusable.

A growing number of furniture items are available that can be disassembled to allow for almost 100% recycling done locally and/or by sending back to the manufacturer. A number of manufacturers also have programs to extend product life for reuse by re-manufacturing and recycling programs in furniture systems (see MR Credit 9.1).

1 point

MR Credit 10

Copper Reduction

Intent

Prevent copper-contaminated stormwater run-off from entering aquatic systems.

Health Issues

Copper is toxic to aquatic species and acutely toxic to plankton and thus can impair the vitality of aquatic ecosystems. Copper enters aquatic systems through direct and indirect sources. In a study of the South San Francisco Bay, 23% of copper was from wastewater treatment plants (the rest was from stormwater sources) and 60 percent of that was estimated to derive from copper pipe corrosion.

Credit Goals

- Eliminate the use of copper metal roofing, copper granule containing asphalt shingles, copper gutters, and copper cladding.

AND

- If using copper pipe requiring the use of solder and flux during installation, specify all solder joints to be compliant with ASTM B828, specify and use ASTM B813 flux to reduce copper pipe corrosion.

Documentation

- Document that the roofing and plumbing schedules and specifications for the project comply with the credit goals.

Reference Standards

ASTM B813-00e1 Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube.

B828-02 Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings.

Palo Alto, CA Municipal Ordinance 16.09.160(b), effective as of January 1, 2003.

<http://www.city.palo-alto.ca.us/government/municipalcode.html>.

Potential Technologies & Strategies

Establish a project goal to eliminate use of exterior copper building products at the project's inception, particularly if the run-off from the building site flows into a sensitive aquatic zone. Identify alternative material options. Reduce copper pipe corrosion through the use of less corrosive fluxes, identified as ASTM B813, offered by most flux manufacturers and by specifying that all solder joints comply with ASTM B828. Using a solderless copper pipe system, such as ProPress, eliminates the need for solder and flux and thereby the source of significant copper corrosion. Alternative pipe materials such as cross-linked polyethylene and cast iron, depending on application, should also be considered as substitutes for copper piping.

Resources

New Palo Alto Ordinance Prohibits Copper Roofing Materials <http://www.city.palo-alto.ca.us/cleanbay/pdf/construction/CuRoofOrd.pdf>.

1 point

MR Credit 11.1Resource Use: **Design for Flexibility****Intent**

Conserve resources associated with the construction and management of buildings by designing for flexibility and ease of future adaptation, and minimizing initial resource use.

Health Issues

Health care facilities undergo substantial renovation and remodeling to accommodate changing technologies and regulatory requirements, thereby generating significant quantities of construction-related wastes, and subjecting building occupants to noise, dust, and other health impacting disruptions associated with construction. By designing flexible, adaptive, generic spaces, buildings can better respond to changes imposed by new equipment and infrastructure requirements with minimum waste and maintain a healthier environment during renovations.

Credit Goals

- Increase building flexibility and ease of adaptive reuse over the life of the structure by employing one (1) or more of the following design and/or space planning strategies such as:
 - modular planning grids
 - use of interstitial spaces
 - development of flexible “technology floors” for diagnostic and treatment facilities to facilitate ease of modifications for changing major equipment.

Documentation

- q Compile evidence of strategies employed to improve ease of adaptive reuse of the structure in future renovations, including floor plans, building sections, or modular technology technical data.

Reference Standards

There is no reference standard for this credit.

MR Credit 11.1 continued

Resource Use: **Design for Flexibility**

Potential Technologies & Strategies

Flexible, adaptable and generic spaces increase building longevity. Strategies for achieving this include:

- Right size the space program, insuring that space assignments are optimized through considering multiple uses for individual spaces, alternative officing (whereby unassigned, flexible workstations are shared by multiple users), and universal sizing (standardized room or workstation sizing).
- Dimensional planning to recognize standard material sizes – wherever possible, design rooms using 2 foot incremental dimensions. An 8 x 11.6' room creates less waste than a 7'-6" x 11'-4" dimension.
- On large-scale projects, consider repetitive design elements. Using redundant dimensions throughout the design of the project facilitates cutting in large batches in a single location.
- Future adaptability, including ample floor-to-floor heights, raised floor distribution systems or interstitial space to allow for ease of future modifications, implementation of undifferentiated "technology floors" to accommodate surgical, cardiology and radiological procedures in equally sized and adaptable planning modules.
- Ease of installation and deconstruction, including modular, demountable building systems that can be relocated, reused, or salvaged in the future. Detailing for easy disassembly by using screws and bolts in place of nails and adhesives will reduce future renovation costs.
- Employ design strategies to reduce the use of materials, such as exposed ceilings, concrete floors, and exposed structural framework.

Resources

New York City High Performance Building Guidelines, Dept of Design and Construction, 1999, <http://www.nyc.gov/html/ddc/html/ddcgreen/>.

Designing With Vision: A Technical Manual for Material Choices in Sustainable Construction, Chapter 8, California Integrated Waste Management Board, July, 2000, <http://www.ciwmb.ca.gov/ConDemo/Pubs.htm>.

1 point

MR Credit 11.2Resource Use: **Minimize Materials****Intent**

Conserve resources associated with the construction and management of buildings by designing for flexibility and ease of future adaptation, and minimizing initial resource use.

Health Issues

Health care facilities undergo substantial renovation and remodeling to accommodate changing technologies and regulatory requirements, thereby generating significant quantities of construction-related wastes, and subjecting building occupants to noise, dust, and other health impacting disruptions associated with construction. By designing flexible, adaptive, generic spaces, buildings can better respond to changes imposed by new equipment and infrastructure requirements with minimum waste and maintaining a healthier environment during renovations.

Credit Goals

Minimize raw material usage of the structure over its life cycle by one or both of the following:

- Demountable and modular building systems or components for partitions, raised floor distribution systems, or the like, comprising a minimum of 5% of the total value of the building component. In the case of modular casework, such casework must comprise 50% of the total combined value of casework and custom millwork.

OR

- Demonstrate construction systems and/or strategies that require less material by utilizing shell elements as finish materials where appropriate (such as exposed ceilings, polished concrete floors, or expressed structure), that reduce total material usage by 5% (not including reuse of existing structure or shell as enumerated in MR Credit 1). Only habitable areas of the building that utilize shell elements as finish materials may be used to fulfill this goal.

Documentation

- c1** Prepare calculations indicating that construction systems or strategies comply with the goals.

Potential Technologies & Strategies

Flexible, adaptable and generic spaces increase building longevity. Strategies for achieving this include:

- Ease of installation and deconstruction, including modular, demountable building systems that can be relocated, reused, or salvaged.
- Detail for easy disassembly by using screws and bolts in place of nails and adhesives.

MR Credit 11.2 continued

Resource Use: **Minimize Materials**

Employ design strategies to reduce the single use of built-in casework. Consider modular casework for ease of installation, deconstruction and reuse at all areas that use standard or basic casework. Employ design strategies to reduce "single use" aspects of reception desks, nursing stations, and the like, whether through use of furniture or through demountable design strategies.

Employ design strategies to reduce the use of materials, such as exposed ceilings, concrete floors, and exposed structural framework.

Resources

New York City High Performance Building Guidelines, Dept of Design and Construction, 1999, <http://www.nyc.gov/html/ddc/html/ddcgreen/>.

Designing With Vision: A Technical Manual for Material Choices in Sustainable Construction, Chapter 8, California Integrated Waste Management Board, July, 2000, <http://www.ciwmb.ca.gov/ConDemo/Pubs.htm>.

Environmental Quality

Required

EQ Prerequisite 1

Minimum IAQ Performance

Intent

Establish minimum indoor air quality (IAQ) performance to prevent the development of indoor air quality problems in buildings, thus contributing to the comfort and well-being of the occupants.

Health Issues

The EPA estimates that indoor air pollution is one of the top five environmental risks to public health and as much as 10 times more polluted than outside air. Indoor air pollutants can cause problems ranging from immediate acute effects such as eye, nose, and throat irritation; sinusitis, asthma attacks, headaches; loss of coordination; and nausea; to long range chronic damage to the lungs, liver, kidney, and central nervous system and cancer. Building materials and the products used to install, clean and maintain them can be significant sources of a wide range of VOCs and other indoor air pollutants. Coupling properly designed, operated and maintained mechanical equipment with low-emitting materials can ensure healthy indoor air.

Credit Goals

- Meet the minimum requirements of voluntary consensus standard ASHRAE 62-2001, Ventilation for Acceptable Indoor Air Quality, and Addenda approved at the time the building was permitted. Mechanical systems shall be designed using the Ventilation Rate Procedure.

Documentation

- Prepare calculations demonstrating that the project is fully compliant with ASHRAE 62-2001 and all published Addenda and describing the procedure employed in the IAQ analysis (Ventilation Rate Procedure).

Reference Standards

ASHRAE 62-2001 Ventilation for Acceptable Indoor Air Quality www.ashrae.org and Standard 62 Addenda page at <http://www.ashrae.org/template/AssetDetail/assetid/30205>.

EQ Prerequisite 1 continued

Minimum IAQ Performance

Potential Technologies & Strategies

Establishing strategies for good indoor air quality at the outset of project development is more effective and achievable than addressing air quality as an issue during construction or building operation. These strategies can be categorized by type and prioritized as follows:

- Ventilation (refer to EQ Credit 2). Develop ventilation strategies that support operable windows, where appropriate. Design for mechanical ventilation air change rates required by health code standards, zoning areas where contaminants are generated.
- Construction Methods (refer to EQ Credit 3). Control indoor air quality during construction and mitigate impacts on occupied building air quality. Flush newly constructed or renovated buildings with 100% outside air prior to occupancy.
- Building Materials (refer to EQ Credits 4 & 8). Significant sources of indoor air pollution are materials and products used in the building, such as adhesives, paints, carpeting, upholstery, manufactured wood products and other components of furniture, including medical furniture & equipment, each of which may emit volatile organic compounds (VOCs), including formaldehyde.
- Source Control (refer to EQ Credit 5 and Operations). Sources can include outdoor pollutants, indoor chemical use (including glutaraldehyde and other sterilizing agents and methylene chloride, used in adhesive removers, paint stripper, and aerosol spray paints), cleaning products, fragrances and pest control activities.,
- Building Maintenance and Operation (refer to EQ Credit 5 and Operations).
- Control systems. Install sensors for relative humidity, temperature, and carbon dioxide. Consider occupant control systems to improve individual comfort.

Resources

High Performance Building Guidelines, New York City DDC, 1999.

I-Beam: The Future of IAQ in Buildings, United States Environmental Protection Agency; EPA 402-C-01-001, December 2002, IAQ Building Education and Assessment Model (I-Beam), www.epa.gov/iaq/largebldgs.

Guidelines for Environmental Infection Control in Health-Care Facilities: Recommendations of CDC and the Health Care Infection Control Practices Advisory Committee (HICPAC), U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Morbidity and Mortality Weekly Report, Recommendations and Reports June 6, 2003 / Vol. 52 / No. RR-10, <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5210a1.htm>.

Required

EQ Prerequisite 2

Asbestos Removal or Encapsulation**Intent**

Reduce the potential exposure of building occupants to asbestos and avoid associated harmful effects of asbestos in existing buildings.

Health Issues

Asbestos exposure is linked to documented health impacts, most notably mesothelioma (a specific kind of cancer of the lung, chest or and abdominal lining) and asbestosis, a chronic form of lung disease. To minimize exposure of building occupants, regulatory authorities require remediation of asbestos containing building materials, either through a process of encapsulation or removal. Asbestos abatement undertaken during renovation while building is partially occupied should take especial precautions to ensure 100% containment of asbestos fibers.

Credit Goals

- Comply with US EPA's asbestos removal, encapsulation and management regulations, NESHAP 40 CFR 61, for asbestos containing material in buildings. Remove any potentially friable asbestos materials that are located in ventilation distribution plenums or chases in accordance with OSHA 29 CFR Part 1926.
- Identify all asbestos containing materials that may be affected by proposed construction activities through a comprehensive audit process. Comply with all authorities having jurisdiction concerning removal and/or encapsulation requirements for each asbestos containing material. Pay attention to means and methods of containment, air quality monitoring during abatement procedures, disposition of debris and disposal of materials.

Documentation

- q Prepare a comprehensive audit of all asbestos located in the existing facility that may be affected by the proposed construction.
- q Obtain documentation certifying that any asbestos-containing materials located in areas affected by proposed construction activities have been removed or encapsulated in accordance with OSHA 29 CFR Part 1926. Obtain certification from an independent testing authority stating that asbestos containing materials are not present in the building or on the site affected by proposed construction activities prior to the start of construction.

Reference Standards

US EPA National Emission Standards for Hazardous Air Pollutants (NESHAP) 40 CFR 61.

Potential Technologies & Strategies

Engage an environmental testing agency and licensed asbestos abatement professional to audit building systems and materials and determine protocols and procedures to encapsulate or remove asbestos containing materials as appropriate.

1 point

EQ Credit 1**Air Quality Monitoring****Intent**

Provide capacity for indoor air quality (IAQ) monitoring to help sustain long-term occupant comfort and well-being.

Health Issues

Elevated CO₂ levels can indicate diminished indoor air quality. By maintaining low CO₂ levels, building occupants experience improved indoor air quality, resulting in improved health and productivity. This is particularly important in hospitals, where patients with impaired immune, respiratory, and neurological systems are especially vulnerable to poor indoor environmental conditions. Children, pregnant women, the elderly, and those with allergies, asthma or chemical sensitivities are also at increased risk of suffering adverse health effects from compromised indoor air quality.

Credit Goals

For mechanical ventilation systems that predominantly serve densely occupied spaces (spaces with a design occupant density greater than or equal to 25 people per 1000 sf (40 sf/ person) provide the following:

- Provide a CO₂ sensor or sampling location for each densely occupied space and compare with outdoor ambient CO₂ concentrations.
- Install CO₂ sensors certified by the manufacturer to have an accuracy of no less than 75 ppm, factory calibrated or calibrated at start-up, and certified by the manufacturer to require calibration no more frequently than once every 5 years.
- Monitor CO₂ sensors by a control system capable of and configured to trend CO₂ concentrations on no more that 15 minute intervals for a period of no less than 6 months.
- Configure the control system to be capable to generate an alarm visible to the system operator if the CO₂ concentration in any zone rises more than 15% above that corresponding to the minimum outdoor air rate required by ASHRAE Standard 62.
- CO₂ sensors may be used for demand controlled ventilation provided the control strategy complies with Standard 62 (see IEQ Prerequisite 1), including maintaining the area-based component of the design ventilation rate.

For all other mechanical ventilation systems, provide the following:

- An outdoor airflow measurement device capable of measuring (and, if necessary, controlling) the minimum outdoor airflow rate at all expected system operating conditions within 15% of the design minimum outdoor air rate.
- The outdoor airflow measurement device shall be monitored by a control system capable of and configured to trend outdoor airflow on no more that 15 minute intervals for a period of no less than 6 months.
- The control system shall be capable and configured to generate an alarm visible to the system operator if the minimum outdoor air rate falls more than 15% below the design minimum rate.

Documentation

- c) Provide summary of the installation, operational design and controls and zones for the air quality monitoring system. For mixed use buildings, calculate dilution rates and allowable carbon dioxide levels for each separate activity level and use.

Reference Standards

ASHRAE Standard 62-2001, Appendix C & D.

ASHRAE Standard 55-1992, Table 4.

Potential Technologies & Strategies

Design the HVAC system with carbon dioxide monitoring sensors in locations with anticipated high occupancy densities and/or long duct runs or those locations that are challenging to provide adequate ventilation. Consider integrating these sensors with the building automation system (BAS).

1 point

EQ Credit 2**Increase Ventilation Effectiveness****Intent**

Provide for the effective delivery and mixing of fresh air to support the safety, comfort and well-being of building occupants.

Health Issues

Providing appropriate ventilation levels is one element of achieving healthy indoor air quality. Proper ventilation rates can be linked to enhanced worker productivity, comfort and reduced absenteeism. These benefits may lead to lower health care and insurance costs. This is particularly important in hospitals, where patients with impaired immune, respiratory, and neurological systems are especially vulnerable to poor indoor environmental conditions. Children, pregnant women, the elderly, and those with allergies, asthma or chemical sensitivities are also at increased risk of suffering adverse health effects from compromised indoor environmental quality.

Credit Goals

- For mechanically ventilated buildings, develop ventilation systems that result in an air change effectiveness (Eac) greater than or equal to 0.9 as determined by ASHRAE 129-1997. For naturally ventilated spaces demonstrate a distribution and laminar flow pattern that involves not less than 90% of the room or zone area in the direction of air flow for at least 95% of hours of occupancy.
- Areas not totaling in excess of 25% of total building area may be excluded where a) air distribution design is mandated and/or restricted by code (such as operating suites, negative pressure rooms, burn rooms, soiled utility rooms and some other critical care rooms) or for b) unoccupied spaces (such as storage and mechanicals areas) or c) spaces with no supply distribution.

Documentation

q For mechanically ventilated spaces, provide calculations demonstrating that the design achieves air change effectiveness (Eac) of 0.9 or greater in each ventilated zone. Complete the table summarizing the air change effectiveness achieved for each zone.

OR

q For mechanically ventilated spaces, compile evidence that the design complies with the recommended design approaches in ASHRAE 2001 Fundamentals Chapter 32, Space Air Diffusion.

OR

q For naturally ventilated spaces, compile evidence that the design provides effective ventilation in at least 90% of each room or zone area in the direction of airflow for at least 95% of the hours of occupancy. Include a table summarizing the airflow simulation results for each zone. Include sketches indicating the airflow pattern for each zone.

Reference Standards

ASHRAE Standard 129-1997.

EQ Credit 2 continued

Increase Ventilation Effectiveness

Potential Technologies & Strategies

Design the HVAC system and building envelope to optimize air change effectiveness. Air change effectiveness can be optimized using a variety of ventilation strategies including displacement ventilation, low-velocity ventilation, plug-flow ventilation such as under floor or near floor delivery, and operable windows. Test the air change effectiveness of the building after construction.

NOTE: EQ Credits 1 & 2 are undergoing substantial review by the USGBC for LEED- NC v2.2 with a redirected focus on outdoor air quantities. We are tracking this process and will consider revision of these credits when the LEED process is complete.

1 point

EQ Credit 3.1

Construction IAQ Management Plan: During Construction

Intent

Prevent indoor air quality problems resulting from the construction or renovation process to sustain the comfort and well-being of construction workers and building occupants.

Health Issues

Protecting indoor air quality is an imperative for health care facilities. Patients with suppressed immune systems and other underlying chronic diseases or conditions and staff responsible for performing critical tasks require healthy air. The most common site of injury associated with airborne pollutants is the lung; acute effects may also include non-respiratory signs and symptoms, depending on the specific toxicity of the pollutants. Health impacts associated with construction practices in health care settings are regulated through Infection Control Risk Assessment (ICRA) policies and procedures in those states that adopt the *AIA Guidelines for Construction of Health Care Facilities* (2001 edition), or most recent update. The Infection Control Risk Assessment, and the Guidelines themselves, mandate development of construction procedures and practices to minimize impacts of construction activities on the health of building occupants in adjacent occupied areas. This credit builds upon the foundation of ICRA procedures to include aspects of sustainable construction practices that go beyond the current provisions of the Guidelines or ICRA.

Credit Goals

Develop and implement an Indoor Air Quality (IAQ) Management Plan for the construction and pre-occupancy phases of the building as follows:

- Manage the site in conjunction with the Infection Control Risk Assessment (ICRA) procedures outlined by the Owner and Designer as defined by Joint Commission on Accreditation of Health Care Organizations (JCAHO) Environment of Care Standard (EC.3.2.1).
- Containment/isolation: In occupied buildings, seal the construction site with deck-to-deck partitions and maintain the construction area under negative pressure throughout the entire construction process. Contain and exhaust odors produced by indoor construction processes (e.g. painting, epoxy flooring, adhesive and coating applications) to insure that they do not migrate in to occupied areas.
- If air handlers must be used during construction, filtration media with a Minimum Efficiency Reporting Value (MERV) of 8 must be used at each return air grill, as determined by ASHRAE 52.2-1999.
- Replace all filtration media immediately prior to occupancy.
- During construction meet or exceed the recommended Design Approaches of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guideline for Occupied Buildings Under Construction, 1995, Chapter 3 and 4.
- Mold & mildew: Prepare a written program to guide actions to prevent mold and mildew growth. Protect absorptive materials from moisture damage while they are stored on-site and after they are installed. Immediately remove from site and properly dispose of any materials with stains, mold, mildew or other evidence of water damage and replace with new, undamaged materials.

EQ Credit 3.1 continued

Construction IAQ Management Plan: **During Construction**

- VOC absorption: Schedule construction procedures to minimize exposure of absorbent materials to VOC emissions. For example, complete “wet” construction procedures such as painting and sealing before storing or installing “dry” absorbent materials such as carpet or ceiling tiles. These absorptive materials act as a “sink”, retaining contaminants and releasing them over time. Store fuels, solvents and other sources of VOCs separately from absorbent materials.
- For painting equipment, develop a plan requiring use of high-volume, low-pressure (HVLP) paint guns and implement the plan when painting equipment is used.
- Maximize use of no or low-VOC emitting construction materials (see EQ Credit 4).
- Pests: Use integrated pest management (IPM) practices (see EQ Credit 5.4 Integrated Pest Management).
- Dust control: use dustless sanding techniques with tools equipped to collect dust. Utilize non-toxic, dustless housekeeping protocols. Comply with GS 37 for cleaning products (see EQ Credit 5.3). Seal ducts during transportation, delivery, and construction to prevent accumulation of construction dust and construction debris inside ducts.
- Environmental Tobacco Smoke Control: Prevent exposure of building occupants, workers and systems to Environmental Tobacco Smoke. Designate “smoking areas” on the construction site. Locate exterior designated smoking areas at least 25 feet away from entries, outdoor air intakes and operable windows.
- Noise Control: Coordinate equipment locations and timing or sequencing of work operations to minimize particularly disruptive, high decibel operations or equipment noise from disturbance of building occupants and workers. Prohibit radios, boom boxes and other noise making equipment in areas where sound may disturb adjoining space occupants.

Documentation

- ❑ Compile, implement and maintain a written Construction IAQ Management Plan highlighting the SMACNA requirements.
- ❑ Compile technical data on filtration media, listing each air filter used during construction and at the end of construction. Include the MERV value, manufacturer name and model number.
- ❑ Maintain a copy of the ICRA developed for the project, highlighting these and any additional measures used to minimize the impact of construction on adjacent areas.
- ❑ Prepare specifications requiring use of high-volume, low-pressure (HVLP) paint guns and certification by an authorized party that plan was implemented, as applicable.
- ❑ Document the design approaches of SMACNA IAQ Guideline for Occupied Buildings Under Construction, Chapter 3, which were used during building construction. Include a brief description of some of the important design approaches employed.
- ❑ Document the management approaches of SMACNA IAQ Guidelines for Occupied Buildings Under Construction, Chapter 4, which were used during building construction.

EQ Credit 3.1 continued

Construction IAQ Management Plan: **During Construction**

Reference Standards

Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guideline for Occupied Buildings Under Construction, 1995.

Duct Cleanliness for New Construction Guidelines, 2000.

NIOSH Publication No. 99-113: Control of Drywall Sanding Dust Exposures.

Potential Technologies & Strategies

Adopt an IAQ Management Plan to protect the HVAC system during construction, control pollutant sources and interrupt contamination pathways. Sequence the installation of materials to avoid contamination of absorptive materials such as insulation, carpeting, ceiling tile and gypsum wall board. Coordinate with Indoor Environmental Quality Credits 3.2 and 5.2 and install only a single set of final filtration media.

Containment-Area Ventilation and Exhaust:

- Do not use building air handling systems serving area of containment for ventilation or exhaust during odor causing processes. Units serving adjacent areas may remain in operation provided they are fully isolated from odor causing areas.
- In renovation areas, keep units that serve occupied areas outside of the construction area in service. On systems to remain in service, seal ductwork openings into the construction area to isolate them from occupied areas. Adjust fan systems or provide temporary relief for excess air from openings sealed. Ensure existing facilities and systems are not adversely impacted by temporary HVAC procedures.
- Provide temporary ventilation and exhaust to areas of containment, separate from building systems.
- Prepare temporary ventilation and exhaust systems to maintain a negative pressure relationship in the construction area relative to the adjacent space. Provide a minimum ventilation of six air changes per hour

1 point

EQ Credit 3.2

Construction IAQ Management Plan: **Before Occupancy****Intent**

Reduce indoor air quality problems resulting from the construction or renovation process to sustain the comfort and well-being of construction workers and building occupants.

Health Issues

The indoor air quality impacts of recently installed construction materials are well documented. Many wet products, such as paints, adhesives, varnishes, and sealants, off-gas considerable levels of volatile organic compounds (VOCs) for months after application, but particularly in the 7 – 14 day period following their initial installation. These may result in a variety of health effects in patients and health care workers, including headaches and respiratory symptoms. Many of the products of particular concern are finish materials, which are on the site late in the construction process, shortly before intended occupancy dates. The American Society of Health Care Engineering recommends SMACNA-based IAQ procedures.

Credit Goals

Develop and implement an Indoor Air Quality (IAQ) Management Plan for the pre-occupancy phase of the building as follows:

- After construction ends and prior to occupancy conduct a minimum two week building flush-out with new filtration media at 100% outside air. After the flushout, replace the filtration media with new filtration media, except for the filters solely processing outside air.

OR

- After construction ends and prior to occupancy conduct a baseline indoor air quality testing procedure that demonstrates that the concentration levels for the chemical contaminants listed below are not exceeded. For each sampling point where the maximum concentration limits are exceeded conduct a partial building flush-out, for a minimum of two weeks, then retest the specific parameter(s) that were exceeded to indicate the goals are achieved. Repeat procedure until all goals have been met.

Chemical Contaminant	Maximum Concentration
Carbon Dioxide (CO ₂) *	8,300 x MET Rate / Ventilation Rate
Formaldehyde	0.05 parts per million
Particulates (PM10)	20 micrograms per cubic meter above outside air conditions
Total Volatile Organic Compounds (TVOC)	500 micrograms per cubic meter
4-Phenylcyclohexene (4-PCH)	3 micrograms per cubic meter (only required if carpet or fabric installed with SB latex backing)
Carbon Monoxide (CO)	9 part per million and no greater than 2 parts per million above outdoor

EQ Credit 3.2 continued

Construction IAQ Management Plan: **Before Occupancy**

CO₂ measurements are only required if the building is regularly occupied during the testing. The ventilation rate is the outdoor air requirement per person, and the CO₂ measurement is the differential between indoor and outdoor conditions based on occupancy type as defined by ASHRAE 62-2001. The MET Rate is as defined in ASHRAE 55.

- The air sample testing shall be conducted as follows:
 - Air samples collected for every 25,000 square feet, or for each contiguous floor area, whichever is greater.
 - Measurements to be conducted with the building ventilation system starting at normal daily start time and operated at the minimum outside air flow rate for the occupied mode throughout duration of the air testing.
 - Building shall be fully finished and unoccupied. Furniture can be included in the testing if desired but it is not required.
 - Test with time weight values of 4 hours with data logging.
 - When retesting non-complying building areas, take samples from the same locations as in first test.

Documentation

☐ Document the building flush-out procedures, including actual dates for building flush out.

OR

☐ Document that the referenced standard's IAQ testing protocol has been followed. Include a copy of the testing results.

AND

☐ Prepare the ICRA for the project, highlighting these and any additional measures used to minimize the impact of construction on adjacent areas.

Reference Standards

Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guideline for Occupied Buildings Under Construction, 1995.

Duct Cleanliness for New Construction Guidelines, 2000.

Potential Technologies & Strategies

Specification of low-emitting materials as per Environmental Quality Credit 4 will improve potential for early passage of baseline testing. Coordinate with Environmental Quality Credits 3.1 and 5.1 and install only a single set of final filtration media. For IAQ testing consider using a recognized measurement protocol such as the EPA "Compendium of Methods for the Determination of Air Pollutants in Indoor Air." Copies of the IAQ testing results should describe the contaminant sampling and analytical methods, the locations and duration of contaminant samples, the field sampling log sheets and laboratory analytical data and the methods and results utilized to determine that the ventilation system was started at the normal daily start time and operated at the minimum outside air flow rate for the occupied mode through the duration of the air testing.

1 point

EQ Credit 4.1**Low-Emitting Materials: Interior Adhesives & Sealants****Intent**

Reduce the quantity of indoor air contaminants that are odorous, potentially irritating and/or harmful to the comfort and well-being of installers and occupants.

Health Issues

Volatile organic compound emissions (VOCs) from adhesives and sealants contribute to lowering indoor and outdoor air quality and negatively affecting human health. These VOCs and the carcinogens and reproductive toxicants addressed by this credit represent a serious health risk to both the installers and the building occupants. The at-risk populations in a health care system with impaired immune, respiratory, and neurological systems are particularly vulnerable to poor indoor environmental conditions. Children, pregnant women, the elderly, and those with allergies, asthma or chemical sensitivities are also at increased risk of suffering adverse health effects from poor indoor environmental quality.

Credit Goals

- Use only adhesives and sealants with volatile organic compound (VOC) content that does not exceed the lower of the current VOC content limits of:

- South Coast Air Quality Management District (SCAQMD) Rule #1168

AND

- Bay Area Air Quality Management District (BAQMD) Regulation 8, Rule 51

EXCEPT FOR

- flat sealants which must not exceed 50 grams/liter (SCAQMD 2008 level)

AND

- aerosol adhesives which must meet Green Seal Standard GC-36 requirements

Note that the California Air Quality Management District rules reduce allowable limits over time. SCAQMD has the lowest limits as of this writing but that is subject to change. Consult the links below to assure you are using the current limits.

- Use only adhesives and sealants with no carcinogen or reproductive toxicant components present at more than 1% of total mass of the product as defined in the following lists:
 - CA OEHHA, Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65).
 - CA Air Resources Board (ARB), list of Toxic Air Contaminants (California Air Toxics).

Documentation

- q Compile a list of adhesives and sealants used in the building and manufacturer verification that they meet the noted goals.

EQ Credit 4.1 continued

Low-Emitting Materials: **Interior Adhesives & Sealants**

Reference Standards

Bay Area Air Quality Management District Regulation 8, Rule 51 & Rule 3,
<http://www.baaqmd.gov/dst/regulations/index.asp>.

CA Air Resources Board (ARB), list of Toxic Air Contaminants (California Air Toxics),
<http://www.arb.ca.gov/toxics/summary/summary.htm>.

Green Seal Commercial Adhesives (GS-36)
<http://www.greenseal.org/standards/commercialadhesives.htm>.

CA OEHHA, Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65),
http://www.oehha.ca.gov/prop65/prop65_list/Newlist.html.

South Coast Air Quality Management District (SCAQMD) Rule #1113,
<http://www.aqmd.gov/rules/reg/reg11/r1113.pdf>.

South Coast Air Quality Management District (SCAQMD) Rule #1168,
<http://www.aqmd.gov/rules/reg/reg11/r1168.pdf>.

Potential Technologies & Strategies

Specify low-VOC and non carcinogenic, non toxic materials in construction documents, including furniture and equipment specifications. Ensure that VOC and carcinogen/toxicant component limits are clearly stated in each section where adhesives and sealants are addressed.

VOC content has serious limitations as a predictor of emissions. Emissions testing protocols are beginning to evolve to evaluate building materials and products. Ask distributors for products with actual emission testing from protocols such as CA 1350 or GreenGuard. This standard will evolve in that direction as more tested products enter the marketplace.

1 point

EQ Credit 4.2**Low-Emitting Materials: Wall & Ceiling Finishes****Intent**

Reduce the quantity of indoor air contaminants that are odorous, potentially irritating and/or harmful to the comfort and well-being of installers and occupants.

Health Issues

Volatiles organic compound emissions (VOCs) from paints wall coverings, acoustical wall treatments, wood paneling systems, ceiling tiles contribute to lowering indoor and outdoor air quality and negatively affecting human health. VOCs, carcinogens and reproductive toxicants represent a serious health risk to both the installers and the building occupants. The at-risk populations in a health care system with impaired immune, respiratory, and neurological systems are particularly vulnerable to poor indoor environmental conditions. Children, pregnant women, the elderly, and those with allergies, asthma or chemical sensitivities are also at increased risk of suffering adverse health effects from poor indoor environmental quality.

Credit Goals

- Paints and coating used on the interior of the building and applied on-site must not exceed the VOC limits and must not include any of the chemical components limited or restricted by the most current version (unless otherwise noted) of the following standards:
 - Topcoat Paints: Green Seal Standard GS-11, Paints.
 - Anti-Corrosive & Anti-Rust Paints: Green Seal Standard GS-03, Anti-Corrosive Paints, for applications on ferrous metal substrates.
 - All other Architectural Coatings, Primers and Undercoats: South Coast Air Quality Management District (SCAQMD) Rule 1113, Architectural Coatings, rules in effect for 1/1/2008.
 - Bay Area Air Quality Management (BAQMD) District Regulation 8, Rule 3.
- When ceiling tiles and or wall coverings are used instead of paint, use only products that:
 - Meet or exceed the indoor air quality requirements of California's Special Environmental Requirements, Specifications Section 01350, updated with California DHS Standard Practice CA/DHS/EHLB/R-174 as determined by independent laboratory testing and using the standard office building protocol parameters.

OR

 - Are certified either by Scientific Certification Systems (SCS) under their Product Certification Program for Indoor Air Quality Performance (which is based upon the CA DHS 01350 protocol) or by GreenGuard Certification Standards for Low Emitting Products for the Indoor Environment.

Documentation

- Compile a list of paints and coatings used in the building and identify manufacturer documentation declaring that they comply with the current VOC and chemical component limits of the credit goals. Listing on the Green Seal Certified Products List or the CHPS Low-Emitting Materials Compliant Materials Table is sufficient.
- Compile documentation indicating that wall covering and ceiling tile products have been tested for compliance with the credit goals. Some tested wall covering and tile products are listed in the CHPS Low-Emitting Materials Compliant Materials Table.

EQ Credit 4.2 continued

Low-Emitting Materials: **Wall & Ceiling Finishes**

Reference Standards

Green Seal Paint Standard GS-11 & GS-03, <http://www.greenseal.org/standards/paints.htm>.

Green Seal Certified Products List, www.greenseal.org/certproducts.htm#paints.

South Coast Air Quality Management District (SCAQMD) Rule 1113, <http://www.aqmd.gov/rules/reg/reg11/r1113.pdf>.

Bay Area Air Quality Management District Regulation 8, Rule 3, www.baaqmd.gov/dst/regulations/index.asp.

Collaborative for High Performance Schools (CHPS), Section 01350 Special Environmental Requirements, www.chps.net/manual/documents/Sec_01350.doc.

DHS Standard Practice CA/DHS/EHLB/R-174, www.dhs.ca.gov/ps/deodc/ehlb/iaq/VOCS/Practice.htm.

CHPS Low-Emitting Materials Compliant Materials Table, www.chps.net/manual/lem_table.htm.

Scientific Certification Systems Indoor Air Quality Performance Environmental Certification Program SCS-EC10-2004 <http://www.scs-certified.com/iaq>

GreenGuard Certification Standards for Low Emitting Products for the Indoor Environment, www.greenguard.org.

Potential Technologies & Strategies

Specify low- and no-VOC paints and coatings in construction documents, including furniture and equipment specifications. Ensure that Green Seal's Standard GS-11 VOC and other chemical limits are clearly stated in each section where paints and coatings are addressed.

GreenSeal Class A paints are lowest toxic content with no VOCs. Use Class A wherever possible.

VOC content has serious limitations as a predictor of emissions. Emissions testing protocols are beginning to evolve to evaluate building materials and products. Ask distributors for products with actual emission testing from protocols such as CA 1350 or GreenGuard. This standard will evolve in that direction as more tested products enter the marketplace.

Avoid paints with added antimicrobials.

Avoid field applied painting entirely by using pre-finished metals.

1 point

EQ Credit 4.3**Low-Emitting Materials: Flooring Systems****Intent**

Reduce the quantity of indoor air contaminants that are odorous, potentially irritating and/or harmful to the comfort and well-being of installers and occupants.

Health Issues

Volatile organic compound emissions (VOCs) from flooring systems contribute to lowering indoor and outdoor air quality and negatively affecting human health. These VOCs and the carcinogens and reproductive toxicants that are also limited here represent a serious health risk to both the installers and the building occupants. The at-risk populations in a health care system with impaired immune, respiratory, and neurological systems are particularly vulnerable to poor indoor environmental conditions. Children, pregnant women, the elderly, and those with allergies, asthma or chemical sensitivities are also at increased risk of suffering adverse health effects from poor indoor environmental quality. Latex backings are restricted in this credit also due to potential allergenic reactions and the growing problem of latex sensitivities in health care settings for staff and patients.

Credit Goals

- Use only carpet and resilient flooring systems that meet or exceed the indoor air quality requirements of:
 - California's Special Environmental Requirements, Specifications Section 01350, updated with California DHS Standard Practice CA/DHS/EHLB/R-174 as determined by independent laboratory testing and using the standard office building protocol parameters.

OR

- The Carpet and Rug Institute (CRI) "Green Label Plus".
- Testing should be done on whole assemblies of flooring with the adhesive, if any, that will be utilized in the installation.
- Use only adhesives and sealants with no carcinogen or reproductive toxicant components present at more than 1% of total mass of the product as defined in the following lists:
 - CA OEHHA, Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65).
 - CA Air Resources Board (ARB), list of Toxic Air Contaminants (California Air Toxics).
- Use only carpets with no natural rubber latex in the backing.

EQ Credit 4.3 continued

Low-Emitting Materials: Flooring Systems

Documentation

- q Obtain documentation that all the carpet and resilient flooring systems have been tested by an independent indoor air quality testing laboratory and modeled to comply with the Section 1350 Reference Specifications for Energy and Resource Efficiency indoor air quality requirements as established by the State of California for the standard office building or one with similar size, ventilation and loading. Assure that tests have been performed within the last twelve months. Listing on the CHPS Low-Emitting Materials Compliant Materials Table or the Carpet and Rug Institute (CRI) "Green Label Plus" listing may be accepted in replacement for actual test data.
- q Obtain documentation that all adhesives and sealants do not exceed the content limits for carcinogenic or reproductive toxicant substances.
- q Obtain documentation that all carpets do not include natural rubber latex in the backing.

Reference Standards

Collaborative for High Performance Schools, Section 01350 Special Environmental Requirements, http://www.chps.net/manual/documents/Sec_01350.doc.

DHS Standard Practice CA/DHS/EHLB/R-174 www.dhs.ca.gov/ps/deodc/ehlb/iaq/VOCS/Practice.htm.

CA Office of Environmental Health Hazard Assessment (OEHHA) Chronic Reference Exposure Limits (REL), www.oehha.ca.gov/air/chronic_rels/AllChrels.html.

CHPS Low-Emitting Materials Compliant Materials Table, www.chps.net/manual/lem_table.htm.

"Green Label Plus" Carpet Testing Program - Approved Products, www.carpet-rug.com/News/040614_GLP.cfm.

Potential Technologies & Strategies

Specify low-VOC carpet and resilient flooring products and systems in construction documents. Ensure that all carcinogenic or reproductive toxicant and other VOC limits are clearly stated where carpet and resilient flooring systems are addressed.

The Carpet and Rug Institute (CRI) "Green Label Plus" program uses most aspects of the 1350 protocol, with the exception of the 1350 stipulation to report out actual chemical concentrations - it is purely a pass-fail based upon a standard office building specification.

Give preference to materials tested by an independent lab in accordance with "Green Label Plus" or using California DHS Standard Practice CA/DHS/EHLB/R-174 for office buildings. If using the "Green Label Plus" certified materials, consider requiring submission of the actual test data from the manufacturer to inform material comparisons.

Note: GreenGuard also provides an evaluation standard for resilient floorings. The GGHC Steering committee is monitoring the debate about the relative efficacy of the 01350 standard and GreenGuard standards and will adjust this credit appropriately as that debate transpires.

1 point

EQ Credit 4.4

Low-Emitting Materials: **Composite Wood & Insulation****Intent**

Reduce the quantity of indoor air contaminants that are odorous, potentially irritating and/or harmful to the comfort and well-being of installers and occupants.

Health Issues

Formaldehyde (HCHO) emissions from casework and other composite wood contribute to lowering indoor and outdoor air quality and negatively affecting human health. Formaldehyde is listed by the U.S. EPA as a probable human carcinogen and by the National Institute for Occupational Safety as a workplace carcinogen. Formaldehyde exposure can result in a range of health effects to both installers and building occupants including: irritation to the mucous membranes, including the eyes and respiratory tract; sensitization resulting in asthma symptoms (e.g., wheezing and chest congestion) and skin reactions; and carcinogenicity. The at-risk populations in a health care system with impaired immune, respiratory, and neurological systems are particularly vulnerable to poor indoor environmental conditions. Children, pregnant women, the elderly, and those with allergies, asthma or chemical sensitivities are also at increased risk of suffering adverse health effects from poor indoor environmental quality.

Credit Goals

- Composite wood and agrifiber products, including core materials, and insulation must contain no added urea-formaldehyde resins. Adhesives used to fabricate laminated in field- and shop-fabricated assemblies containing these products must contain no urea-formaldehyde.

Documentation

- q Obtain documentation, confirming that all the composite wood, casework, fiberglass, insulation (both acoustic and thermal), agrifiber products and furniture finishes used in the building contain no added urea-formaldehyde resins.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Review the MSDS and other printed literature accompanying building materials and products, especially for composite wood products, casework, fiberglass products, insulation (both acoustic and thermal) agriboard products, and furniture finishes to ensure that no added urea-formaldehyde was used in the products' manufacture. Specify and use urea-formaldehyde-free substitutes that achieve equal or superior performance.

1 point

EQ Credit 4.5

Low-Emitting Materials: Furniture & Medical Furnishings

Intent

Reduce the use of furniture including medical furnishings that may release indoor air contaminants that are odorous or potentially irritating and may be deleterious to installer and occupant health, comfort and well-being.

Health Issues

Volatile organic compounds (VOCs) and other chemical emissions from furniture systems contribute to lowering indoor and outdoor air quality and negatively affect human health. These VOCs and the carcinogens and reproductive toxicants that are also limited here represent a serious health risk to both the installers and the building occupants. Urea formaldehyde is targeted as an issue of particular concern as a widely used resin that is a known carcinogen and also poses respiratory and allergic health risks. An increasing body of evidence likewise points to an association of asthma and other bronchial problems with exposure to phthalates, in addition to their known reproductive system hazards.

In addition, several persistent bioaccumulative toxicants often used in furniture products are being found at levels of concern in the general population and are raising serious health concerns. There is growing evidence that many of the brominated flame retardants (BFRs) used to counteract the high flammability of plastics have toxic properties in animal studies akin to chlorinated persistent bioaccumulative toxicants such as dioxin and PCBs, including immune suppression, endocrine disruption, nervous system disorders, and cancer. Of particular concern are the polybrominated diphenyl ethers (PBDEs) widely used in furnishings. Likewise the perfluorochemicals (PFCs) used directly in the manufacture of many stain protection and non stick treatments, most notably perfluorooctanoic acid (PFOA), or resulting as a breakdown product, are showing up in human blood samples in increasing frequency and are demonstrating a parallel broad range of toxicological effects in animal studies.

The at-risk populations in a health care system, including children, pregnant women, the elderly, and those with allergies, asthma, chemical sensitivities or otherwise impaired immune, respiratory, and neurological systems are particularly vulnerable to poor indoor environmental conditions.

Credit Goals

- Select a minimum of 40% (by cost) of all furniture and medical furnishings (including mattresses, foams, panel fabrics and other textiles) that do not contain at least three of the four listed materials:
 - Polybrominated diphenyl ethers (PBDE)
 - Perfluorooctanoic acid (PFOA)
 - Urea formaldehyde
 - Phthalate plasticizers

OR

- That do not contain at least two of the four listed materials and either:
- Meet or exceed the indoor air quality requirements of California's Special Environmental Requirements, Specifications Section 01350, updated with California DHS Standard Practice CA/DHS/EHLB/R-174 as determined by independent laboratory testing and using the standard office building protocol parameters

EQ Credit 4.5 continued

Low-Emitting Materials: Furniture & Medical Furnishings

(Note: at the release of Version 2.0 the 01350 standard had not yet been modified for direct use with furniture. California DHS is in the process of establishing a Standard Practice for furniture. This goal will not be applicable until that time.)

OR

- Are certified either by Scientific Certification Systems (SCS) under their Product Certification Program for Indoor Air Quality Performance (which is based upon the CA DHS 01350 protocol) or by GreenGuard under their Certification Standards for Low Emitting Products for the Indoor Environment.
- Prepare specification language identifying the BFR free goal to the furniture dealer/contractor for the aforementioned material categories and indicating that review of material content will be a criterion in all substitution reviews.

Documentation

- ☐ Obtain documentation listing product description (all components) and complete matrix indicating how many of the criteria are met for each furnishing group.
- ☐ If applicable, obtain test results of the furniture assemblies tested in accordance with the noted CA 01350 protocol or GreenGuard indicating that the emissions limits have not been exceeded. Test results must be current within twelve (12) months of the project specification, and must be dated and signed by an officer of the independent laboratory where the testing was conducted,

Reference Standards

Collaborative for High Performance Schools, Section 01350 Special Environmental Requirements, http://www.chps.net/manual/documents/Sec_01350.doc.

CA Office of Environmental Health Hazard Assessment (OEHHA) Chronic Reference Exposure Limits (REL), http://www.oehha.ca.gov/air/chronic_rels/AllChrels.html.

Testing Requirements For Volatile Organic Compound Emissions, DGS Environmental Specifications for Office Furniture Systems, <http://www.ciwmb.ca.gov/greenbuilding/Specs/Furniture/>.

Scientific Certification Systems Indoor Air Quality Performance Environmental Certification Program SCS-EC10-2004 <http://www.scscertified.com/iag>

GreenGuard Certification Standards for Low Emitting Products for the Indoor Environment, www.greenguard.org.

Potential Technologies & Strategies

Ensure that the material limitations plus the VOC and other chemical limit standards of the 01350 specification and GreenGuard are clearly stated in each section where furniture is specified.

BFRs are rarely listed on material sheets and PFCs are most commonly used as a process chemical or are a break down product, so show up as a contaminant rather than a final ingredient. Determining association of these chemicals with furniture may require direct discussion with manufacturers. PFCs are used most commonly in common stain and non-stick treatments, including Scotchguard®, Teflon®, Stainmaster®, Scotchban®, and Zonyl®.

Avoid all brominated flame retardants (BFRs), including not only PBDEs, but also TBBPA, HBCD and others. One potential strategy is to specify seating with mesh and no foam to meet the PBDE-free goal.

1 point

EQ Credit 4.6

LowEmitting Materials: Exterior Applied Products**Intent**

Protect installers and building occupants and safeguard air quality resulting from exposure to hazardous and/or odorous substances used during construction.

Health Issues

Health care construction rarely occurs on undeveloped sites remote from ongoing existing operations. In most instances, construction operations are proximate to existing operational health care facilities, where construction practices have health impacts on adjacent building occupants and building system performance.

There are potential hazards associated with the installation of roofing and solvent-based materials, including hot-applied materials, such as coal tar and asphalt roofing and waterproofing bitumens as well as VOC emissions from single-ply systems. These potential hazards contribute to lowering indoor and outdoor air quality and represent a serious health risk to both the installers and the building occupants. The at-risk populations in a health care system with impaired immune, respiratory, and neurological systems are particularly vulnerable to poor indoor environmental conditions. Children, pregnant women, the elderly, and those with allergies, asthma or chemical sensitivities are also at increased risk of suffering adverse health effects from poor indoor environmental quality.

Credit Goals

- Specify and use coatings, roofing and waterproofing materials that meet or are lower than the VOC limits of Bay Area Air Quality Management District Regulation 8, Rule 51 & Rule 3.
- Contain or eliminate through material selection, odors, fumes, vapors or other emissions produced by outdoor construction processes (i.e., bituminous roofing and waterproofing) from infiltrating occupied areas. Comply with procedures established by NIOSH Publication No. 2003-112: Asphalt Fume Exposures During the Application of Hot Asphalt to Roofs.

Documentation

- ❑ Prepare a written containment plan for isolating potentially hazardous or odorous substances occurring during construction to insure that they do not migrate in occupied areas and evidence of implementation.
- ❑ Obtain a cut sheet and a Material Safety Data Sheet (MSDS) for each material used in the building highlighting VOC limits.

Reference Standards

Bay Area Air Quality Management District Regulation 8, Rule 51 & Rule 3,
<http://www.baaqmd.gov/dst/regulations/index.asp>.

NIOSH Publication No. 2003-112: Asphalt Fume Exposures During the Application of Hot Asphalt to Roofs.

EQ Credit 4.6 continued

Low-Emitting Materials: Exterior Applied Products**Potential Technologies & Strategies**

Periodically monitor outdoor air quality at intakes during construction to insure that outdoor air contaminants are not entering the building systems. Routinely inspect air intakes and plenums leading to work area. Establish containment barriers to isolate the work area from occupied areas. Seal all openings between contained areas and adjacent areas, including but not limited to windows, doorways, elevator openings, corridor entrances, drains, grates and skylights, with exceptions of the means of entry and exit.

1 point

EQ Credit 5.1**Chemical & Pollutant Source Control: Outdoor****Intent**

Avoid exposure of building occupants to potentially hazardous outdoor soils and pollutants that adversely impact air quality and human health.

Health Issues

Hospitals are particularly vulnerable to indoor air quality threats, as many patients are immuno-compromised and have increased chemical susceptibilities. Indoor air pollution often begins with unintended outdoor pollutants penetrating the building envelope. Health care buildings are highly trafficked, with large numbers of staff and visitors entering the building. Vehicular traffic patterns often include idling vehicles near major entryways.

Credit Goals

Design to minimize pollutant contamination of regularly occupied areas due to exterior factors:

- Specify textured paving for outside approaches in accordance with accessibility and safety protocols, so that soils are scraped off shoes prior to entering building.
- Employ permanent entryway systems (grilles, grates, etc) to capture dirt, particulates, etc. from entering the building at all high volume entryways and, at a minimum, removable entryway systems at all entrances. Develop the associated cleaning, maintenance and replacement strategies to maintain those entryway systems.
- Establish all HVAC equipment air intakes a minimum distance from the following sources and a minimum of 10 feet above finish grade:
 - Minimum of 50' from loading docks, ambulance bays, and entrances where vehicles are arriving or leaving. Prohibit idling in these locations.
 - Minimum of 50' from loading docks, ambulance bays, and entrances where vehicles are arriving or leaving. Prohibit idling in these locations.
 - Minimum of 50' from vegetation/ landscape subject to pesticide or herbicide applications
 - Minimum of 100' from helipads.
 - Minimum of 50' from designated smoking areas (see EQ Prereq 1).
 - Minimum of 50' from other sources of potential air contaminants.

Documentation

- q Compile a building plan showing all high volume entryways of installed permanent entryway systems (grilles, grates, etc).
- q Compile a building plan indicating location of all fresh air intakes and their distances from all sources of exterior contaminants.

EQ Credit 5.1 continued

Chemical & Pollutant Source Control: **Outdoor**

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Minimize introduction of dirt with appropriately sized, recessed metal grating or similar entryway system within vestibules. Install additional “walk-off mats” in entryways to prevent dirt from entering the building.

1 point

EQ Credit 5.2**Chemical & Pollutant Source Control: Indoor****Intent**

Avoid exposure of building occupants to potentially hazardous indoor pollutants and chemicals that adversely impact air quality and human health.

Health Issues

Hospitals are particularly vulnerable to indoor air quality threats, as many patients are immuno-compromised and have increased chemical susceptibilities. Equally important, the Joint Commission on the Accreditation of Health Care Organizations (JCAHO) has expressed increasing concern over growing respiratory issues among health care workers. JCAHO has identified indoor chemical pollutants as a contributing factor to indoor air quality issues, including photocopiers, glutaraldehyde and ethylene oxide sterilants, xylene, aerosolized medication distribution systems, anesthetic gases, chemotherapeutic agents, latex, cleaners and floor finishes.

Credit Goals

Design to minimize pollutant cross-contamination of regularly occupied spaces:

- Where chemical use occurs (including soiled utility areas, sterilization areas, housekeeping areas and copier areas), establish segregated areas with deck to deck partitions and separate outside exhaust of at least 0.50 CFM per square foot, (for rooms containing disinfectant and sterilant applications, provide minimum 12 air changes/hour) no air re-circulation and maintain a negative pressure compared with the surrounding spaces of at least an average of 5 Pa (0.02 inches of water gauge) and with a minimum of 1 Pa (0.004 inches of water) when the door(s) to the room(s) are closed.
- Establish regularly occupied areas of the building with new air filtration media prior to occupancy that provide a Minimum Efficiency Reporting Value (MERV) of 13 or better.

Documentation

- q Compile a building plan showing all rooms where chemical mixing occurs, and that all chemical use areas and copy rooms have been physically separated with deck to deck partitions; independent exhaust ventilation has been installed at 0.50 cfm/square foot (for rooms containing disinfectant and sterilant applications, a minimum of 12 air changes/hour shall be provided) and that a negative pressure differential has been achieved.
- q Compile a listing of each filter that must be installed prior to occupancy including the MERV requirements value, manufacturer name and model number.
- q Include review of equipment locations as part of the initial building commissioning plan.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Isolate potential pollution sources through separate zoning of areas where contaminants are generated. Locate copiers, fax machines and other office equipment in spaces with direct exhaust ventilation. In diagnostic and treatment areas, include utility rooms with negative pressure and direct exhaust to accommodate sterilization systems and other medical equipment that require chemical use.

1 point

EQ Credit 6.1**Controllability of Systems: Lighting****Intent**

Provide a high level of temperature and ventilation or lighting system control by individual occupants, or by specific groups in multi-occupant spaces (i.e., holding and recovery areas, treatment spaces, patient rooms), to promote the productivity, comfort and well-being of building occupants.

Health Issues

Building occupants' health is directly impacted by the degree of control that individuals can exercise over their immediate environment. Given the wide range and variety of individuals receiving care, patient or resident control cannot be extended to all elements of the physical environment. Because the sense of loss of control can be disturbing and stressful to patients or residents and their family members, every effort should be made to allow individual control over as many elements of the environment as possible and reasonable, including but not limited to temperature, lighting, and privacy. Control over lighting, window treatments, and temperature directly impacts the quality of the experience of the interior environment. Occupant control of ventilation or air flow may conflict with regulatory requirements for ventilation rates and pressurization in health care environments.

Credit Goals

- Provide individual lighting controls for 90% of the building occupants. Automatic daylight dimming controls must be provided for permanently installed lighting that is within 15 feet inside of and 2 feet to either side of all windows and 10 feet around skylights and 10 feet from the exterior face of clerestories.

Documentation

- Compile controls schematic drawings demonstrating that the required lighting controls are provided.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Design the building with occupant controls for temperature and lighting. Strategies to consider include lighting controls, task lighting, operable windows where practical, and thermostats.

1 point in addition to EQ Credit 6.1

EQ Credit 6.2

Controllability of Systems: **Thermal & Ventilation**

Intent

Provide a high level of temperature and ventilation or lighting system control by individual occupants, or by specific groups in multi-occupant spaces (i.e., holding and recovery areas, treatment spaces, patient rooms), to promote the productivity, comfort and well-being of building occupants.

Health Issues

The health of building occupants is directly impacted by the degree of control that individuals can exercise over their immediate environment. Control over temperature directly impacts the quality of the experience of the interior environment. Studies have shown that occupant control over the immediate thermal environment positively impacts patient and staff satisfaction, while decreasing overall energy consumption.

Occupant control of ventilation or air flow may conflict with regulatory requirements for ventilation rates and pressurization in health care facilities.

Credit Goals

- Establish individual temperature and ventilation controls for 50% of the occupants. Operable windows can be used in lieu of individual controls for areas that are 20 feet inside of and 10 feet to either side of the operable part of the window. The areas of operable window must meet the requirements of ASHRAE 62-2001, paragraph 5.1.

Documentation

- Compile controls schematic drawings demonstrating the required individual ventilation and temperature controls are provided.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Design the building with occupant controls for airflow, temperature and lighting. Strategies to consider include underfloor HVAC systems with individual diffusers, displacement ventilation systems and operable windows.

1 point

EQ Credit 7

Continuous Comfort Monitoring System

Intent

Provide a thermally comfortable environment that supports the productivity and well-being of building occupants.

Health Issues

Occupant comfort is an essential component of healthy and productive indoor environments. By optimizing thermal control, including humidity control, there are documented improvements in occupant health, including improved respiratory function, and reduced mold and mildew growth. This is particularly important in hospitals, where patients are likely to have suppressed immune systems or other illnesses that make them more vulnerable to poor indoor environmental conditions.

Credit Goals

- Provide a permanent monitoring system and process for corrective action to ensure thermal comfort criteria to comply with ASHRAE Standard 55-2004, Thermal Comfort Conditions for Human Occupancy.

Documentation

- q Obtain documentation that identifies the comfort criteria, strategy for ensuring performance to the comfort criteria, description of the permanent monitoring system implemented, and process for corrective action as may be appropriate.
- q Verify that the temperature and humidity controls were (or will be) tested as part of the scope of work for Energy and Atmosphere Prerequisite 1, Fundamental Building Systems Commissioning. Include the document name and section number where the commissioning work is listed.

Reference Standards

ASHRAE Standard 55-2004

Potential Technologies & Strategies

Develop a strategy and implement systematic monitoring of the actual performance of the building to the comfort criteria selected per IEQ Credit 7.1. As appropriate, monitoring may include measurement and trending of temperatures, relative humidity or air speed selected according to their variability and impact on occupant comfort, or annual validation of continued performance to the selected comfort criteria conducted per ASHRAE Standard 55-2004, Section 7 Validation of the Thermal Environment.

5 points

EQ Credit 8.1

Daylight & Views: **Daylight for Occupied Spaces****Intent**

Provide building occupants with a connection between indoor spaces and the outdoors by introducing daylight and views into the building's regularly occupied areas.

Health Issues

Americans now spend almost 90% of their time indoors. Increasingly, studies are beginning to postulate and link a range of health issues with inadequate exposure to light or inappropriate light-dark cycles. The distinction between daylight and electrically lit spaces is much more significant than is often acknowledged: daylight intensity levels are in the range of 10,000 to 40,000 lux, while a brightly lit interior averages between 300 and 500 lux. Daylight changes and modulates not only in intensity but also in spectrum and creates cues for the passage of time with continuously changing shadow patterns.

Benefits of natural light in hospitals and health care facilities include improved physiological and psychological states for both patients and staff. Studies show that daylighting can reduce the stress experienced by caregivers, patients and families.

Studies also indicate that daylighting can reduce post surgical recovery time. Moreover, in certain illnesses, the human biological clock or the circadian system plays an important role in maintaining the well-being of the individual by alleviating depression, improving night sleep quality, alertness and performance quality. In Alzheimer's patients, for example, exposure to bright lights during the day consolidates night time sleep, which in turn reduces the stress on caregivers. "ICU psychosis", a state of delirium experienced in critical care environments, is dramatically reduced when spaces are daylight.

Daylighting in long term care facilities is beneficial in maintaining calcium levels, sleep patterns among elderly, and higher ambient lighting levels required for the aging eye (glare should be prevented). Recent studies have linked the quality of light to the quality of life for frail elderly.

Credit Goals

- Diagnostic and Treatment Areas: Establish the following planning thresholds to provide access to daylight for regularly occupied space as follows. Using the table below that corresponds to overall floor plate area; design the building to provide the following percentages of area within 15 feet of a window on the perimeter. Courtyards or atria with a minimum width of 10 feet per vertical story qualify as perimeter. This calculation is based upon a percentage of total floor area (building GSF), and is independent of function or layout. If the perimeter varies between stories, the total floor area can be used and averaged (for example: in a 2 story building of 14,000 sf per floor, one story at 40% and one story at 80% would average to 60%, achieving 2 points in the "below 20,000 sf" category):

Criteria percent of total floor area within 15' of perimeter window by total size					
Point Total	Below 20,000 sf	20,000 to 30,000 sf	30,000 to 40,000 sf	40,000 to 50,000 sf	Above 50,000 sf
1 point	48%	44%	40%	37%	34%
2 points	56%	51%	46%	42%	38%
3 points	64%	58%	52%	47%	42%

EQ Credit 8.1 continued

Daylight & Views: **Daylight for Occupied Spaces**

- Inpatient Units (2 points): Provide access to daylight on inpatient units as follows:
 - 1 point: Provide access to daylight for 90% of patient and public spaces, subject to the following requirements: In multi-bed rooms, provide a window configuration to ensure that both patients have visual connection to the outdoors, even when cubicle curtains are closed.
 - 1 point: Achieve a Daylight Factor of 2% for 75% of staff occupied areas, including nursing stations, lounges, conference rooms, etc.
- Distance from exterior walls may be increased if a Daylight Factor of 2% can be maintained at greater distance from the perimeter through the use of light shelves or other technologies. Glazing in exterior walls shall be in accordance with Credit 8.2 Views. In perimeter corridor solutions, only the corridor area will be considered unless spaces adjoining the corridors have glazing in accordance with Credit 8.2. Glazed spaces overlooking atria are exempted from the 2% Daylight Factor goal.

Documentation

- cq** Compile area calculations that define the percentages achieved and with prediction calculations.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Design the building to maximize interior daylighting. Insure compliance with the goal early in the design process, acknowledging site constraints at the programming stage, when block planning is tested and initial design parameters are established.

Strategies to consider include building orientation, shallow floor plates, increased building perimeter, courtyards, atria and light wells. Daylighting efficacy can be improved with use of exterior and interior permanent shading devices, high performance glazing, light shelves, high performance window treatments and photo-integrated light sensors. Predict daylighting via calculations or model daylighting strategies with a physical or computer model to assess foot-candle levels and daylight factors achieved.

Resources

Verderber, S (February, 1983) "Human Response to Daylighting in the Therapeutic Environment." 1983 International Daylighting Conference. Phoenix, AZ: General Proceedings, pg. 415.

Edwards, L. and Torcellini, P. A Literature Review of the Effects of Natural Light on Building Occupants, National Renewable Energy Laboratory, Golden, CO, July, 2002. NREL/TP-550-30769. Chapter 8, Daylighting in Health Care.

Daylight in Buildings: A Source Book on Daylighting Systems and Components, International Energy Agency Solar Heating and Cooling Programme, July, 2000, www.iea-shc.org.

Heschong Mahone Group, Daylighting in Schools: An Investigation into the Relationship between Daylight and Human Performance, A Report to Pacific Gas and Electric Company, August, 1999, www.h-m-g.com.

1 point

EQ Credit 8.2**Daylight & Views: Building Orientation****Intent**

Connect patients, visitors, and staff to the natural environment.

Health Issues

Research shows that physical and visual connections to the natural environment (access to outdoor space, views of nature, natural daylighting) provide social, psychological, and physical benefits. Such connections also assist in patient recovery and healing, reduce stress, and improve the overall health care environment. Similar benefits accrue to the staff, thus leading to improved delivery of services to the patients they serve.

Credit Goals

- Assess the site and surrounding area and develop a master plan for incorporating ways of experiencing significant natural features (on-site and distant) into the overall site and building planning. Incorporate nature as an essential element of the building design in order to enhance the healing process.

Documentation

- Compile plans demonstrating site planning principles to maximize the experience of significant natural features for therapeutic value.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Strategies include building orientation and siting, and the siting and layout of all site development elements (e.g., arrival drive, drop-off, parking, site amenities). Strategies also include window placement in treatment settings, patient rooms and other therapeutic environments. Identify and prioritize the sites' natural attributes that are to be protected, conserved, or restored as components of this experience.

Identify microclimates and provide a progression of protective, flexible settings to encourage use throughout the year.

1 point

EQ Credit 8.3**Daylight & Views: Views for Occupied Spaces****Intent**

Provide building occupants with a connection between indoor spaces and the outdoors by introducing daylight and views into the building's regularly occupied areas.

Health Issues

Views from windows have been cited in medical literature as having psychotherapeutic qualities through both the visual qualities and natural lighting components; environments with access to views are often characterized as "more therapeutic" (Vischer 1986; Verderber 1983). Regulations require that patient sleeping rooms contain windows, with some exceptions. Aside from these areas, there are virtually no additional regulations that mandate light and views for occupied spaces in health care settings, despite the evidence based research concerning the benefits.

Credit Goals

- Establish direct line of sight to vision glazing for building occupants in 90% of all staff occupied areas including offices, corridors, nursing stations, break rooms, cafeterias, and lobbies.
 - Areas directly connected to perimeter windows must have a glazing-to-floor area ratio of at least 0.07. Parts of the floor area with horizontal view angles of less than 10 degrees at 50 inches above the floor cannot be included in this calculation. End of corridor windows fulfill the goal for unobstructed length of the corridor.
 - Spaces not directly connected to perimeter windows must have a horizontal view angle of less than 10 degrees at 50 inches above the floor involving 50% or more of the room area. If the room meets these goals then the entire room area is considered to meet the view goal.
 - Exceptions to the goals include diagnostic and treatment rooms (if controlled environment prohibits introduction of natural light), copy rooms, storage areas, utility rooms, mechanical, and laundry rooms.

Documentation

- Compile diagrams describing and demonstrating that the building occupants in 90% of regularly occupied spaces will have direct lines of site to perimeter glazing.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Implement design strategies to provide line of sight access to exterior, such as glazing in corridors, borrowed light vision panels between perimeter spaces and building core areas.

1 point

EQ Credit 8.4**Daylight & Views: Lighting & Circadian Rhythm****Intent**

Improve alertness levels, work performance, staff satisfaction and health, and reduce medical errors, by providing lighting systems based on circadian rhythm.

Health Issues

While health care facilities often focus on public space lighting, the actual interior treatment areas and working environments are often overlooked. During the day, lighting in staff work areas fails to stimulate work performance, and during the night the lighting fails to support high levels of alertness. Intermittent exposure to bright light or creating "light showers" are proven techniques in shift work environments to reduce fatigue, improve alertness, and improve cognitive functioning in night shift staff. The normal function of the body at night is to produce high levels of melatonin, resulting in sleepiness. When lighting does not assist the body in adjustment to night shift work, the circadian system becomes desynchronized, contributing to low alertness and deteriorated work performance. Other observed symptoms are sleep disturbance, carbohydrate cravings, confusion or loss of coordination, and susceptibility to infectious disease.

Credit Goals

- Establish electric lighting systems and controls for patient areas and staff work areas based upon principles of circadian rhythm (a self-sustained biological rhythm that in an organism's natural environment normally has the period of approximately 24 hours).
- In patient areas, establish lighting design solutions that allow for variation in day and night lighting characteristics.
- In staff areas, establish lighting to support work performance and alertness through both daytime and night lighting cycles. Implement a no rotation work routine to be able to address the needs of the day and the night shift appropriately.
- Establish ambient and task lighting that is variable spectrum, free of glare, and task oriented. Where daylight is not achievable, provide electric lighting systems that simulate daylight, brightness and diurnal variation, and allow individual and central lighting control systems.

Documentation

- q Compile drawings and specification information outlining the lighting system design for staff work areas, with documentation supporting how the lighting system responds to circadian rhythm.

Reference Standards

There is no reference standard for this credit.

EQ Credit 8.4 continued

Daylight & Views: Lighting & Circadian Rhythm**Potential Technologies & Strategies**

For staff areas subject to night work, a short intermittent exposure to higher level of light is beneficial. Insure that bright light is available. Provide for variability of lighting characteristics such as intensity, spectrum (from cool to warm light) and distribution shifting levels of light throughout the night hours, with variability in lighting color from cool to warm. Prevailing indirect light with too little direct component will result in sleepiness.

In patient areas without daylight, provide lighting that varies throughout the day. Systems should allow light levels to gradually increase and decrease throughout the day hours, moving from warm to cooler and back again. Provide individual controls that allow patients to reset or alter the lighting. Provide dimming capacity.

1 point

EQ Credit 9

Acoustic Environment**Intent**

Provide building occupants with a healing environment free of disruptive levels of sound.

Health Issues

Noise is a well documented source of stress in health care settings. Noise from personnel, equipment, and visitors impacts patient privacy and sleep patterns. In turn, noise increases stress levels for patients and caregivers. Research finds that in hospitals that reduced noise levels, the patients' satisfaction with care giving increased, their sleep improved, and their blood pressure lowered; similarly, staff in low-noise environments were more positive about their jobs and indicated improved sleep.

The World Health Organization recommends that continuous background noise in hospital rooms should not exceed 35 decibels (dB), and nighttime peaks in patient care areas should not exceed 40 dB. Studies have found that background noise levels typically are in the range of 45 to 68 dB and many peaks commonly exceed 90 dB.

Credit Goals

- Specify materials, products, mechanical systems and design features to attenuate sound and vibration, and not to exceed Room Criteria (RC) ratings listed for Hospital and Clinics in Table 34 of Chapter 46, Sound and Vibration Control, 1999 ASHRAE Application Handbook.
- Select ceiling tiles with an NRC (Noise Reduction Coefficient) above .85 and a CAC (Ceiling Attenuation Class) of at least 35.
- Test sound levels as a component of Building Commissioning.

Documentation

- ❑ Obtain documentation that sound and vibration will not exceed Room Criteria (RC) ratings listed for Hospital and Clinics in Table 34 of Chapter 46, Sound and Vibration Control, 1999 ASHRAE Application Handbook.
- ❑ Indicate sound transmission ratings on all interior partition types and ceiling selections.

Reference Standards

Sound and Vibration Control, 1999 ASHRAE Application Handbook Chapter 46.

Potential Technologies & Strategies

In nursing unit planning, avoid locating patient rooms adjacent to elevators, stairwells, nurse stations, and visitor/ public spaces. Acoustically isolate patient rooms from each other and from the corridor. Locate televisions in public and staff areas only where there is adequate space for patients and staff to be out of hearing range if they so choose. Provide headsets for televisions and radios located in semi-private rooms or other locations where sound can carry to other patients.

Select hard surface flooring products for best acoustic properties. Use sound absorbing finish materials in waiting areas and other public spaces adjacent to patient units. In open bay treatment areas, such as Emergency Departments or Recovery rooms, select ceiling products for best acoustic properties. At

nurse stations and open staff areas, carefully integrate sound absorbing elements (ceilings, furniture systems, etc.) to reduce noise.

Isolate anchorage of vibration generating equipment from the building structure. Locate noise generating mechanical and electrical equipment away from patient and staff areas, and from neighboring residential communities.

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Innovation in Design

4 points

IN Credit 1 Innovation in Design

Intent

To provide design teams and projects the opportunity to achieve points for exceptional performance above credit goals set by the *Green Guide for Health Care* and/or innovation for green building goals and strategies not specifically addressed by the *Green Guide for Health Care*.

Health Issues

The relationship between buildings and health is continuously evolving. The health care industry is uniquely positioned to evolve ever more powerful and innovative strategies to enhance building performance. These credits are intended to reward exemplary performance of existing credits and encourage implementation of innovative design elements.

Credit Goals

Credit 1.1 (1 point)	Identify the intent of the proposed innovation credit, the proposed credit goals , proposed documentation to demonstrate achievement, and the design approach used to meet the goals.
Credit 1.2 (1 point)	Same as Credit 1.1.
Credit 1.3 (1 point)	Same as Credit 1.1.
Credit 1.4 (1 point)	Same as Credit 1.1.

Documentation

- Prepare the proposal(s) (including intent, credit goal, submittals and design approach) and relevant evidence of performance achieved.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Substantially exceed a GGHC credit threshold such as for energy performance or water efficiency. Apply strategies or measures that are not covered by GGHC such as education of occupants, community development or adding additional toxics screens to material choices.

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Operations Credits

Intent

The *Green Guide for Health Care* has developed specific credits related to operations and maintenance as a critical component of a sustainable design program. The organizational intent for this inclusive approach is summarized as follows:

- Most health care construction projects are undertaken by existing institutions that already have ongoing operations and maintenance protocols in place, even if the project that is the subject of this application is a free-standing new building on a clean site.
- The distinction between existing buildings and new construction in health care is often complex and difficult to precisely define, while high performance building standards often rely on this distinction for including operations and maintenance considerations. Operations aimed at reducing the facility's environmental footprint often yield substantial economic benefits for institutions.

Health Issues

Acute and long-term health care facilities operate on a continuous, 24-hour, 7-day basis. Consequently, many operations and maintenance tasks are performed with staff and patients in occupancy, where it is challenging, if not impossible, to isolate building occupants from associated environmental health impacts. Thus, building operations, construction operations and maintenance procedures must be evaluated relative to health impacts on patients, who are often immunocompromised and vulnerable to environmental issues, and on staff, whose responsibility to provide critical care should not be impeded by a compromised indoor environment. The Joint Commission on the Accreditation of Hospitals (JCAHO) recognizes the occupational health issues for staff working in these built environments.

Organization

The *Green Guide* Operations section is organized in accordance with commonly understood areas of responsibility in health care organizations. Each credit corresponds to a distinct aspect of the operation of health care facilities; within each credit, a series of points define a range of opportunities and strategies to reduce the environmental footprint of the health care facility's ongoing operation.

Integrated Operations

Required

IO Prerequisite 1

Integrated Operations & Maintenance Process

Intent

Demonstrate a cross discipline approach in Operations and Maintenance decision-making and implementation to ensure safe, healthful, environmentally sensitive methods and materials.

Health Issues

Acute and long term health care facilities operate on a continuous, 24-hour, 7-day basis. Consequently, many operations and maintenance tasks are performed with staff and patients in occupancy, where it is challenging, if not impossible, to isolate building occupants from associated environmental impacts. Thus, building operations, construction operations and maintenance procedures must be evaluated relative to health impacts on patients, who are often immunocompromised and vulnerable to environmental issues, and on staff, whose responsibility to provide critical care should not be impeded by a compromised indoor environment. The Joint Commission on the Accreditation of Hospitals (JCAHO) recognizes the occupational health issues for staff working in these built environments.

Credit Goals

- Demonstrate functional cross discipline process for decision-making regarding safe, healthful and environmentally sensitive operations and maintenance and encourage continuous improvement.

Documentation

- q Compile an Environmental Health Goals Statement for operations and maintenance procedures and protocols, encouraging continuous improvement.
- q Define cross discipline decision making process for operations and maintenance decisions.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Organize and schedule regular meetings of all related operations groups to integrate functional processes into the daily operation of the facility that jointly consider environmental and health impacts of decisions and opportunities for continuous improvement.

Required

IO Prerequisite 2

Recertification Process

Intent

Maintain the ongoing functional application of all design decisions and processes associated with the initial design certification.

Health Issues

Ongoing operations and maintenance procedures are inextricably linked to occupant health and safety. Monitoring O&M practices for consistency with original design intent and facility environmental/health policies helps to ensure that indoor air quality and mechanical performance standards are maintained.

Credit Goals

- Specify processes to monitor and document actual performance of each measure achieved in the initial design.

Documentation

- On a bi-annual basis, update performance data, policies and procedures and other required documentation to recertify compliance with Construction and Operations credit intents.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Address each credit individually, documenting current compliance or actual operational performance (as applicable).

Update the *Green Guide* Checklist on a periodic basis with a goal toward continuous improvement.

Required

IO Prerequisite 3**Environmental Tobacco Smoke (ETS) Control****Intent**

Prevent exposure of building occupants and systems to Environmental Tobacco Smoke (ETS).

Health Issues

There are well-known health risks associated with Environmental Tobacco Smoke (or "secondhand smoke"). A 1993 report published by the United States EPA, *Respiratory Health Effects of Passive Smoking: Lung Cancer and Other Disorders*, concluded that secondhand smoke causes lung cancer in adult nonsmokers and impairs the respiratory health of children, corroborating earlier studies undertaken by the National Academy of Sciences and the U.S. Surgeon General. The EPA report classified secondhand smoke as a Group A carcinogen, indicating sufficient evidence of the substance causing cancer. Only 15 other substances, including asbestos, benzene and radon, carry the Group A carcinogen designation. Prohibiting smoking within buildings is the most effective way to avoid exposure to secondhand smoke.

Credit Goals

- Prohibit smoking in the building (except as noted below).
- Establish any exterior designated smoking areas at least 50 feet (15.24 meters) away from entries, operable windows, air intakes, bus stops, disabled parking, and other locations where occupants could inadvertently come in contact with ETS when occupying, entering or leaving the building.
- Only for residential facilities where the functional program requires accommodation for smokers may there be an exception to establish negative pressure smoking rooms:
 - Provide one or more designated smoking rooms designed to effectively contain, capture and remove ETS from the building. At a minimum, the smoking room must be directly exhausted to the outdoors with no re-circulation of ETS-containing air to the non-smoking area of the building, and enclosed with impermeable deck-to-deck partitions and operated at a negative pressure compared with the surrounding spaces of at least an average of 5 Pa (0.02 inches of water gauge) and with a minimum of 1 Pa (0.004 inches of water) when the door(s) to the smoking room are closed.
 - Performance of the smoking room differential air pressures shall be verified by conducting 15 minutes of measurement, with a minimum of one measurement every 10 seconds, of the differential pressure in the smoking room with respect to each adjacent area and in each adjacent vertical chase with the doors to the smoking room closed. The testing will be conducted with each space configured for worst case conditions of transport of air from the smoking rooms to adjacent spaces.

IO Prerequisite 3 continued

Environmental Tobacco Smoke (ETS) Control

Documentation

- c) Prepare a copy of the no-smoking policy.
- c) Prepare a copy of the building site plan indicating designated smoking areas and their distances from entries, operable windows, air intakes, and other locations where occupants could inadvertently come in contact with ETS.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Prohibit smoking in the building and other locations where occupants could inadvertently come in contact with ETS. Take into account prevailing winds and micro-climate effects in siting exterior smoking areas.

Resources

US EPA, Respiratory Health Effects of Passive Smoking: Lung Cancer and Other Disorders
<http://cfpub1.epa.gov/ncea/cfm/recordisplay.cfm?deid=2835>.

Required

IO Prerequisite 4**Outside Air Introduction & Exhaust Systems****Intent**

Establish minimum indoor air quality (IAQ) performance to enhance indoor air quality in buildings, thus contributing to the health and well-being of the building occupants.

Health Issues

The EPA estimates that indoor air pollution is one of the top five environmental risks to public health and is as much as 10 times more polluted than outside air. Indoor air pollutants can cause problems ranging from immediate acute effects such as eye, nose, and throat irritation; sinusitis, asthma attacks, headaches; loss of coordination; and nausea; to long range chronic damage to the lungs, liver, kidney, and central nervous system and cancer.

Maintaining indoor air quality begins with careful monitoring of outside air at intakes into the indoor air distribution system, as well as the system's exhaust components. Coupling properly designed, operated and maintained mechanical equipment with low-emitting materials can ensure healthy indoor air.

Credit Goals

- Modify or maintain existing building outside-air (OA) ventilation distribution system to supply, at a minimum, the outdoor air ventilation rate required by ASHRAE 62.1-2004. (ASHRAE 62.1.1-2001 with all Addenda can be used until ASHRAE 62.1-2004 is published.)
- Meet the EPA IAQ guidelines OR SMACNA IAQ guidelines for HVAC System Maintenance to ensure the proper operations and maintenance of HVAC components as they relate to IAQ.
- Test and maintain the operation of all building exhaust systems, including bathroom, utility areas, laboratories, kitchen and parking exhaust system.

Documentation

- q Provide a letter and backup tabular information from a mechanical engineer or HVAC system specialist demonstrating that the existing building outside-air (OA) ventilation distribution system supplies at least the outdoor air ventilation rate required by ASHRAE 62.1-2004. (ASHRAE 62.1-2001 with all Addenda can be used until ASHRAE 62.1-2004 is published.)
- q Provide a letter and backup tabular information from a mechanical engineer or HVAC system specialist demonstrating that the exhaust air HVAC systems serving the building are operating as designed.
- q Provide the results of four quarterly inspections of the building OA/exhaust air system to verify that the system is operating as intended.

IO Prerequisite 4 continued

Outside Air Introduction & Exhaust Systems

Reference Standards

ASHRAE 62.1-2004. (ASHRAE 62.1-2001 with all Addenda can be used until ASHRAE 62.1-2004 is published.)

Potential Technologies & Strategies

Conduct a visual inspection of OA air vent/dampers and remove any OA air vent/louver obstructions that restrict full OA capacity from entering the distribution system. Conduct airflow monitoring to document OA in terms of CFM. Compare measured flow to designed flow for each unit. Test the operation of each exhaust fan and verify that exhaust airflow meets design requirements/intents.

1 point

IO Credit 1.1

Building Operations & Maintenance: **Staff Education**

Intent

Support appropriate operations and maintenance of buildings and building systems to ensure they deliver target building performance goals over the life of the building.

Health Issues

Ongoing operations and maintenance procedures are inextricably linked to occupant health and safety. Monitoring O&M practices for consistency with original design intent and facility environmental/health policies helps to ensure that indoor air quality and mechanical performance standards are maintained.

Credit Goals

- Have in place over the performance period a building operations and maintenance staff education program that provides each staff person with primary building maintenance responsibilities with a minimum 24 hours of education each year over the performance period on building and building systems operations, maintenance, and achieving sustainable building performance. Training must be of high quality and relevant to building operations and maintenance.

Documentation

- Document the training received by building operations and maintenance staff listing the course titles and hours, and annual total training hours for each staff person and the calculated annual average training hours for all by building operations and maintenance staff.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Arrange on-site or off-site training for building operations and maintenance staff that addresses building and building systems operation, maintenance, and achieving sustainable building performance.

1 point

IO Credit 1.2

Building Operations & Maintenance: **Building Systems Maintenance**

Intent

Support appropriate operations and maintenance of buildings and building systems to ensure they deliver target building performance goals over the life of the building.

Health Issues

Ongoing operations and maintenance procedures are inextricably linked to occupant health and safety. Monitoring O&M practices for consistency with original design intent and facility environmental/health policies helps to ensure that indoor air quality and mechanical performance standards are maintained.

Credit Goals

- Have in place over the performance period a comprehensive best practices equipment preventative maintenance program that provides in-house resources and/or contractual services to deliver post warranty maintenance.

Documentation

- Document ongoing operations over the performance period of a best practices equipment maintenance program including documentation of in-house resources and/or contractual services to deliver post warranty maintenance.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Establish over the performance period a comprehensive best practices equipment preventative maintenance program. Utilize either in-house resources and/or contractual services to deliver post warranty equipment maintenance.

1 point

IO Credit 1.3

Building Operations & Maintenance: **Building Systems Monitoring**

Intent

Support appropriate operations and maintenance of buildings and building systems to ensure they deliver target building performance goals over the life of the building.

Health Issues

Ongoing operations and maintenance procedures are inextricably linked to occupant health and safety. Monitoring O&M practices for consistency with original design intent and facility environmental/health policies helps to ensure that indoor air quality and mechanical performance standards are maintained.

Credit Goals

- Have in place over the performance period a system for continuous tracking and optimization of systems that regulate indoor comfort and the conditions (temperature, humidity, and CO₂) delivered in occupied spaces. The system must include:
 - Continuous monitoring of system equipment performance and of the indoor environmental conditions delivered in the building;
 - Alarms for performance or conditions that require repair;
 - A system in place that delivers prompt repairs to problems identified.

Documentation

- q** System Description
 - Compile a narrative of the systems employed to continuously monitor equipment function and space conditions. The narrative must describe how these systems are used to identify and resolve equipment problems and to continuously deliver indoor comfort and the conditions delivered in occupied spaces.
 - List of system equipment for which performance and the number of points are monitored.
 - List of the indoor environmental conditions parameters monitored and the number of points monitored for each.
 - List of settings for alarms.
 - Description of system in place for delivering prompt repairs to problems identified.
- q** Performance over the performance period
 - Document alarms that occurred.
 - Document percent of time desired conditions are delivered in the building on a floor area weighted basis.

Reference Standards

There is no reference standard for this credit.

IO Credit 1.3 continued

Building Operations & Maintenance: **Building Systems Monitoring**

Potential Technologies & Strategies

Use of automated systems to monitor equipment function and indoor space conditions provides the opportunity to identify system problems automatically and issue an alarm that initiates procedures to fix the problems identified.

1 point

IO Credit 2.1

IAQ Management: Maintaining Indoor Air Quality

Intent

Enhance Indoor Air Quality (IAQ) performance by optimizing practices to prevent the development of indoor air quality problems in buildings.

Health Issues

The EPA estimates that indoor air pollution is one of the top five environmental risks to public health and as much as 10 times more polluted than outside air. Indoor air pollutants can cause problems ranging from immediate acute effects such as eye, nose, and throat irritation; sinusitis, asthma attacks, headaches; loss of coordination; and nausea; to long range chronic damage to the lungs, liver, kidney, and central nervous system and cancer. Building materials and the products used to install, clean and maintain them can be significant sources of a wide range of VOCs and other indoor air pollutants. Coupling properly designed, operated and maintained mechanical equipment with low-emitting materials can ensure healthy indoor air.

Credit Goals

- Establish an IAQ Compliance Program, as outlined in "A Guide to Managing Indoor Air Quality in Health Care Organizations", Joint Commission on Accreditation of Healthcare Organizations, 1997.

OR

- Develop and implement on an ongoing basis an IAQ management program based on the U.S. EPA document "Building Air Quality: A Guide for Building Owners and Facility Managers".

Documentation

- q Compile an IAQ Compliance Program or checklist for the facility.

Reference Standards

"A Guide to Managing Indoor Air Quality in Health Care Organizations", Joint Commission on Accreditation of Healthcare Organizations, 1997.

U.S. EPA "Building Air Quality: A Guide for Building Owners and Facility Managers", Document No. 402-F-91-102, December 1991. www.epa.gov/iaq/largebldgs/graphics/iaq.pdf

Potential Technologies & Strategies

Establish and implement a program to enhance IAQ performance by optimizing practices to prevent the development of indoor air quality problems on an ongoing basis, thereby enhancing the well being of the building occupants. Survey building and evaluate systems to identify potential IAQ problems. Include in the program a plan for preventing moisture accumulation and mold in the building.

IO Credit 2.1 continued

IAQ Management: **Maintaining Indoor Air Quality**

Establishing guiding principles for indoor air quality associated with operations and maintenance is important to ensure established thresholds are achieved and maintained during the life of the building. Procedures to monitor compliance with design intent should be standard practice. These strategies can be categorized by type and prioritized as follows:

- Ventilation (refer to Construction: EQ Credit 2 and Operations: IO Credit 3). Monitor mechanical ventilation air change rates required by health code standards, zoning areas where contaminants are generated.
- Building Materials (refer to Construction: EQ Credit 4). Significant sources of indoor air pollution are materials and products used in the building, such as cleaning compounds, adhesives, paints, carpeting, upholstery, manufactured wood products and other components of furniture, including medical furniture & equipment, each of which may emit volatile organic compounds (VOCs), including formaldehyde.
- Source Control (refer to Construction: EQ Credit 5 and Operations: ES Credits 1-4). Sources can include outdoor pollutants, indoor chemical use (including glutaraldehyde and other sterilizing agents and methylene chloride, used in adhesive removers, paint stripper, and aerosol spray paints), cleaning products, fragrances and pesticides.
- Building Operations and Maintenance (refer to EQ Credit 5 and Operations).

Resources

I-Beam: The Future of IAQ in Buildings, United States Environmental Protection Agency; EPA 402-C-01-001, December 2002, IAQ Building Education and Assessment Model (I-Beam), <http://www.epa.gov/iaq/largebldgs>.

High Performance Building Guidelines, New York City DDC, 1999.
<http://www.nyc.gov/html/ddc/html/ddcgreen/reports.html>

1 point

IO Credit 2.2

IAQ Management: Reduce Particulates in Air Distribution

Intent

Reduce exposure of building occupants and maintenance personnel to potentially hazardous particulate contaminants.

Health Issues

The EPA estimates that indoor air pollution is one of the top five environmental risks to public health and as much as 10 times more polluted than outside air. Indoor air pollutants can cause problems ranging from immediate acute effects such as eye, nose, and throat irritation; sinusitis, asthma attacks, headaches; loss of coordination; and nausea; to long range chronic damage to the lungs, liver, kidney, and central nervous system and cancer. Building materials and the products used to install, clean and maintain them can be significant sources of a wide range of VOCs and other indoor air pollutants. Coupling properly designed, operated and maintained mechanical equipment with low-emitting materials can ensure healthy indoor air.

Credit Goals

- Have filters with particulate removal effectiveness of MERV 13 or greater in place over the performance period for all outside air intakes and for the returns for the re-circulation of inside air. Establish and follow a regular schedule for maintenance and replacement of these filters.

Documentation

- q Verify that the building has had filters in place over the performance period with particulate removal effectiveness of MERV 13 or greater for all outside air intakes and for the returns for the re-circulation of inside air.
- q Verify that a regular schedule for maintenance and replacement of these filters has been established and followed over the performance period.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Install and maintain in place filters with particulate removal effectiveness of MERV 13 or greater for all outside air intakes and for the returns for the re-circulation of inside air. Establish and follow a regular schedule for maintenance and replacement of these filters.

Transportation Operations

1 point

TO Credit 1.1

Alternative Transportation: **Public Transportation Access**

Intent

Reduce pollution and land development impacts from single occupancy vehicle use.

Health Issues

Motor vehicles represent the largest single source of atmospheric pollution including nitrogen oxides (a precursor of smog); benzene (a carcinogen); particulate matter (a trigger of respiratory illness and symptoms); volatile organic compounds (some of which are potentially hazardous and a precursor of smog); carbon dioxide (a greenhouse gas and a trigger for global climate change); and carbon monoxide (a probable human carcinogen).

Credit Goals

- Provide and maintain a building occupant conveyance program (shuttle-link) for buildings that are more than 1/2 mile from commuter rail or subway and 1/4 mile from established bus routes.

Documentation

- Retain records and results of quarterly contracts with shuttle-link service providers to determine if service continues to be provided within specified distances from building.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Perform a transportation survey of future building occupants to identify transportation needs. Establish shuttle services to encourage use of mass transit options by staff, visitors and other building occupants.

1 point

TO Credit 1.2**Alternative Transportation: Low Emitting & Fuel Efficient Vehicles****Intent**

Reduce pollution and land development impacts associated with single occupancy vehicle use.

Health Issues

Health care facilities often utilize fleets of vehicles for the purposes of maintaining and operating their facilities. These vehicles range from ambulances to delivery vans to shuttle buses, which often operate continuously and relatively locally. Motor vehicles represent the largest single source of atmospheric pollution including nitrogen oxides (a precursor of smog); benzene (a carcinogen); particulate matter (a trigger of respiratory illness and symptoms); volatile organic compounds (some of which are potentially hazardous and a precursor of smog); carbon dioxide (a greenhouse gas and a trigger for global climate change); and carbon monoxide (a probable human carcinogen). By reducing emissions, alternative fuel fleets contribute to healthier air quality, benefiting the health of the building occupants and the surrounding community.

Credit Goals

- Own or lease an alternative fuel vehicle fleet, using any combination of the acceptable fuel types, and comprising a minimum of 50% of total fleet mileage driven annually. Provide fueling stations for 100% of alternative fuel fleet, and preferred parking for such fleets, as applicable. Acceptable fuel types include bio-diesel, low-sulfur diesel, hydrogen, compressed natural gas, hybrid or all-electric.

Documentation

- q Document proof of ownership of, or 2 year lease agreement for, hybrid or alternative fuel vehicles and calculations indicating that the vehicles will comprise 50% of hospital operated vehicle fleet, in terms of miles driven per year. Prepare site drawings showing preferred parking for those fleets.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Provide transportation amenities such as alternative fuel vehicle fleets to provide on-campus transportation or between-campus transportation, transportation to remote parking and staff housing, ambulance and ambulette fleets, refueling stations and carpool/vanpool programs.

Low-sulfur diesel fuel and biodiesel are becoming available in many markets nationwide, particularly in regions designated as non-attainment areas or where there are high levels of ground level ozone. Low-sulfur diesel fuels can be used in all diesel engines without modifications. Biodiesel is usable in most diesel engines as well, although in some older engines may require changing of rubber gaskets and more frequent changing of filters during initial use as it cleans the system. Note that use of biodiesel may affect warranty coverage.

1 point

TO Credit 1.3**Alternative Transportation: Carpool Programs****Intent**

Reduce pollution and land development impacts associated with automobile use.

Health Issues

Motor vehicles represent the largest single source of atmospheric pollution including nitrogen oxides (a precursor of smog); benzene (a carcinogen); particulate matter (a trigger of respiratory illness and symptoms); volatile organic compounds (some of which are potentially hazardous and a precursor of smog); carbon dioxide (a greenhouse gas and trigger for global climate change); and carbon monoxide (a probable human carcinogen).

Credit Goals

- Provide and maintain a building occupant carpooling program that serves a minimum of 5% of the full time equivalent (FTE) peak period staff and add no new parking. Provide preferred parking for carpool participants.

Documentation

- Maintain records of carpool participants and document participation by 5% of the FTE peak period staff.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Perform a transportation survey of future building occupants to identify transportation needs. Establish carpool program to assist staff in organizing efficient carpool partners.

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Energy Efficiency

Required

EE Prerequisite 1

Existing Building Commissioning

Intent

Verify that fundamental building systems and assemblies are performing as intended to meet current needs and sustainability requirements.

Health Issues

Energy efficiency benefits health by reducing particulate, chemical and greenhouse gas emissions associated with fossil-fuel based combustion and electrical generation, thereby improving outdoor air quality and curbing global climate change.

Credit Goals

- 1. Verify and ensure that fundamental building elements and systems are installed, calibrated, and operating as intended so they can deliver functional and efficient performance.
- 2. Carry out a comprehensive existing building commissioning including the following procedures:
 - 2a. Develop a comprehensive building operation plan that meets the requirements of current building usage, and addresses the heating system, cooling system, humidity control system, lighting system, safety systems and the building automation controls.
 - 2b. Prepare a commissioning plan for carrying out the testing of all building systems to verify that they are working according to the specifications of the building operation plan.
 - 2c. Implement the commissioning plan documenting all the results.
 - 2d. Repair or upgrade all systems' components that are found to not be working according to the specifications of the building operation plan.
 - 2e. Re-test all building components that required repairs or upgrades to verify that they are working according to the specifications of the building operation plan.

OR

- Submit a 1-5 year plan for continuous improvement of these aspects of commissioning requirements 1-6 until all aspects are completed. During the implementation of the continuous improvement plan, demonstrate continuous improvement on a yearly basis until all aspects are completed. All low cost and no cost measures must be implemented in the first 2 years of the implementation program.

EE Prerequisite 1 continued

Existing Building Commissioning

Documentation

- Compile a narrative summary of the current building operation plan that highlights major building systems and assemblies.
- Verify that all 6 actions in the Credit Goals have been completed.

OR

- If one or more aspects of the 6 actions in the Credit Goals have not been completed, prepare a 5 Year Plan that includes a schedule of annual actions that will be implemented in order to complete all 6 actions in the Credit Goals within 5 years.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

The commissioning process activities begin by identifying the current building operating intents (Owner's Operational Requirements) and then proactively making sure that the buildings' systems are operating as necessary to meet these operating intents.

Required

EE Prerequisite 2

Minimum Energy Performance

Intent

Establish the minimum level of energy performance for the building and systems.

Health Issues

Energy efficiency benefits health by reducing particulate, chemical and greenhouse gas emissions associated with fossil-fuel based combustion and electrical generation, thereby improving outdoor air quality and curbing global climate change.

This prerequisite has been defined to require a building baseline computation that recognizes regulatory context and that is based upon actual ongoing building performance as a basis for defining performance improvement.

Credit Goals

- Demonstrate that the building has achieved an EPA ENERGY STAR® score of at least 60 utilizing the EPA ENERGY STAR Benchmarking Tool for building types addressed by ENERGY STAR,

Documentation

- If the building type is addressed by ENERGY STAR® (such as acute care hospitals and medical office buildings), compile benchmarking tool output documenting that the building energy has achieved an EPA ENERGY STAR score of at least 60.
- Compile a summary of the annual energy bills, including cost and usage amounts (kilowatt-hours, therms, gallons, etc.), for each type of energy used by the building.
- Review copies of the most recent 12 months of building energy bills.

Reference Standards

EPA's ENERGY STAR® National Energy Performance Rating System, www.energystar.gov/benchmark.

Potential Technologies & Strategies

Retrofit building systems to improve energy performance while maintaining or improving health and safety requirements. Consider the following strategies as are regionally and climatically appropriate:

- Building envelope improvements to reduce energy requirements, including, for example, insulation, window and door replacements.
- Energy (latent and sensible) recovery.
- Ground source heat pumps.

EE Prerequisite 2 continued

Minimum Energy Performance

- Evaporative cooling when ambient conditions allow.
- Reduce outside airflow during unoccupied periods.
- Expand unoccupied temperature dead band by automatically resetting zone temperature set points based on occupancy.
- Separate HVAC zones with constant airflow, temperature and humidity control requirements from those with single or double shift occupancy that would allow reductions in air changes or setbacks in temperature and humidity. Provide a cooling system with at least two cooling loops operated at different temperatures. This can be accomplished with separate chillers (or direct tower cooling).
- Design for high partial-load heating and cooling efficiency.
- Integrate daylighting strategies to decrease building energy demand.
- Design high efficiency chiller plants that use various technologies and strategies to reduce overall plant energy consumption at full and partial loads (such as chillers with variable speed drives on the compressors, primary-only variable flow pumping, series-counterflow chiller arrangements, etc.).
- Use low leakage air handling units to reduce overall fan horsepower while ensuring that air is properly filtered.
- Retrofit using high efficiency lighting, variable speed motors, and Energy Star-rated equipment to reduce electrical consumption.

Required

EE Prerequisite 3**Ozone Protection****Intent**

Reduce ozone depletion.

Health Issues

Stratospheric ozone layer depletion increases exposure to ultraviolet radiation, increasing risk factors for skin cancer and immune system depression. The United States is one of the world's largest emitters of ozone depleting substances. As part of the U.S. commitment to implementing the Montreal Protocol, the EPA has implemented regulations relative to the responsible management of CFCs, including programs to end the production of ozone depleting substances.

Credit Goals

- Zero use of CFC-based refrigerants in HVAC&R base building systems unless a third party audit shows that system replacement or conversion is not economically feasible.
 - Definition of required economic analysis: The replacement of a chiller will be considered to be not economically feasible if the simple payback of the replacement is greater than 10 years. To determine the simple payback, divide the cost of implementing the replacement by the annual cost avoidance for energy that results from the replacement and any difference in maintenance costs. If CFC-based refrigerants are maintained in the building, reduce annual leakage to 5% or less using EPA Clean Air Act, Title VI, Rule 608 procedures governing refrigerant management and reporting, and reduce the total leakage over the remaining life of the unit to less than 30% of its refrigerant charge.

Documentation

q Document that base building HVAC&R systems do not use CFCs.

OR

q Document results of third-party audit demonstrating that replacement is not economically feasible.

q Document compliance with EPA Clean Air Act, Title VI, Rule 608 governing refrigerant management and reporting.

q Document that the annual refrigerant leakage rate is below 5% and the leakage over the remainder of unit life is being maintained below 30%.

Reference Standards

EPA Clean Air Act, Title VI, Rule 608 governing refrigerant management and reporting.

Potential Technologies & Strategies

Set up leakage minimization procedures and systems to meet annual leakage minimization standards and reporting requirements.

1-10 points

EE Credit 1

Optimize Energy Performance

Intent

Achieve increasing levels of energy efficiency to reduce environmental and health burdens associated with excessive energy use.

Health Issues

Energy efficiency can enhance human health by reducing particulate, chemical and greenhouse gas emissions associated with fossil-fuel based combustion and electrical generation, thereby improving outdoor air quality and curbing global climate change.

Credit Goals

- Demonstrate the EPA ENERGY STAR® score that the building has achieved. Utilize the EPA ENERGY STAR Benchmarking Tool for building types addressed by ENERGY STAR.

Credit 1.1 (1 point)	Energy Star score of 63
Credit 1.2 (2 points)	Energy Star score of 67
Credit 1.3 (3 points)	Energy Star score of 71
Credit 1.4 (4 points)	Energy Star score of 75
Credit 1.5 (5 points)	Energy Star score of 79
Credit 1.6 (6 points)	Energy Star score of 83
Credit 1.7 (7points)	Energy Star score of 87
Credit 1.8 (8 points)	Energy Star score of 91
Credit 1.9 (9 points)	Energy Star score of 95
Credit 1.10 (10 points)	Energy Star score of 99

Documentation

- q Compile a summary of the annual bills, including cost and usage amounts (kilowatt-hours, therms, gallons, etc.), for each type of energy used by the building annually over the performance period.
- q Review copies of the most recent 12 months of building utility bills including both energy use and peak demand, if available.

AND

- q If the building type is addressed by EPA's ENERGY STAR®, such as for acute care hospitals and medical office buildings, compile benchmarking tool output documenting the building EPA ENERGY STAR scores over the performance period.

EE Credit 1 continued

Optimize Energy Performance

Reference Standards

EPA's ENERGY STAR® National Energy Performance Rating System, www.energystar.gov/benchmark.

Potential Technologies & Strategies

Implement energy-efficiency retrofits and energy-saving techniques to reduce energy use to the level required to earn this credit.

Retrofit building systems to improve energy performance while maintaining or improving health and safety requirements. Consider the following strategies as are regionally and climatically appropriate:

- Building envelope improvements to reduce energy requirements, including insulation, window and door replacements.
- Energy (latent and sensible) recovery.
- Ground source heat pumps.
- Evaporative cooling when ambient conditions allow.
- Reduce outside airflow during unoccupied periods.
- Expand unoccupied temperature dead band by automatically resetting zone temperature set points based on occupancy.
- Separate HVAC zones with constant airflow, temperature and humidity control requirements from those with single or double shift occupancy that would allow reductions in air changes or setbacks in temperature and humidity.
- Provide a cooling system with at least two cooling loops operated at different temperatures. This can be accomplished with separate chillers (or direct tower cooling).
- Design for high part-load heating and cooling efficiency.
- Integrate daylighting to decrease building energy costs.
- Design high efficiency chiller plants that use various technologies and strategies to reduce overall plant energy consumption at full and part loads (such as chillers with variable speed drives on the compressors, primary-only variable flow pumping, series-counterflow chiller arrangements, etc.).
- Use low leakage air handling units to reduce overall fan horsepower while ensuring that air is properly filtered.
- Retrofit using high efficiency lighting, variable speed motors, and Energy Star® rated equipment to reduce electrical consumption.

1-4 points

EE Credit 2**On-Site and Off-Site Renewable Energy****Intent**

Encourage and recognize increasing levels of on-site and off-site renewable energy in order to reduce environmental and health burdens associated with fossil fuel energy use.

Health Issues

Energy generated from environmentally sensitive renewable energy resources reduces the particulate, chemical and greenhouse gas emissions associated with fossil-fuel generated electricity, thereby improving outdoor air quality and curbing global climate change.

Credit Goals

- Over the performance period, fulfill some or all of the building's total energy use through the use of on-site or off-site renewable energy systems. Points are earned according to the following table. The percentages shown in the table are the percentage of building energy use over the performance period met by renewable energy resources.
- Off-site renewable energy sources are as defined by the Center for Resource Solutions (CRS) Green-e products certification requirements or the equivalent. Green power may be procured from a Green-e certified power marketer, a Green-e accredited utility program, or through Green-e certified Tradable Renewable Certificates or the equivalent. At least 25% of any off-site green power or Green Certificates used to earn this credit needs to be from new sources (sources constructed after 1997). For on-site renewable energy that is claimed for this credit, the associated environmental attributes must be retained or retired and cannot be sold.
- Up to the four-point limit, any combination of individual actions will be awarded the sum of the points allocated to those individual actions. For example, one point would be awarded for implementing 1% of on-site renewable energy. Two additional points would be awarded for meeting 10% of the building's electrical load with renewable power or certificates over the performance period.

Total Points	On-site Renewable Energy		Off-site Renewable Energy Certificates
1	1%	OR	5%
2	2%	OR	10%
3	5%	OR	25%
4	10%	OR	50%

EE Credit 2 continued**On-Site and Off-Site Renewable Energy**

Documentation

- q Compile system schematic diagrams and narrative highlighting on-site renewable energy systems installed in the building.
 - q Meter energy output of on-site renewable energy system over the performance period to determine compliance with the requirements.
 - q Compile calculations documenting the percentage of the building's total energy requirements that was supplied by on-site renewable energy systems for the performance period.
- OR
- q Calculate the percentage of the building's electrical load that was met with renewable power or certificates over the performance period.
 - q Compile documentation demonstrating that the supplied renewable power or certificates over the performance period met the referenced Green-e requirements or the equivalent.
 - q Confirm a commitment to continue purchases of renewable power or certificates at the same or higher level over the next performance period.

Reference Standards

Center for Resource Solutions Green-e Products Certification Requirements. Center for Resource Solutions, www.green-e.org.

Potential Technologies & Strategies

Design and specify the use of on-site nonpolluting renewable technologies to contribute to the total energy requirements of the project. Consider and employ solar, geothermal, wind, biomass (other than unsustainably harvested wood) and biogas technologies.

Purchase renewable energy or renewable energy tradable certificates to meet some or all of the building's energy requirements. Review historic building electrical consumption trends. Research power providers in the area and select a provider that guarantees that a fraction of its delivered electric power is derived from net nonpolluting renewable technologies. If the project is in an open market state, investigate green power and power marketers licensed to provide power in that state. Grid power that qualifies for this credit originates from solar, wind, geothermal, biomass or low-impact hydro sources.

1 point

EE Credit 3

Energy Efficient Equipment**Intent**

Reduce energy consumption by using energy-efficient medical and other equipment.

Health Issues

Energy efficiency benefits health by reducing particulate, chemical and greenhouse gas emissions associated with fossil-fuel based electrical generation, thereby improving outdoor air quality and curbing global climate change.

Credit Goals

- Obtain and install a minimum 75%, based on cost, of the annual electrical medical and office equipment, that is either Energy Star® qualified, or in the top 25th percentile for energy consumption for that class of equipment.

Documentation

- ❑ Compile a listing of all medical and office equipment purchased and calculations demonstrating that the threshold percentage of Energy Star-qualified products is achieved.
- ❑ Where Energy Star-qualified equipment is not yet available for an application, demonstrate reasonable effort to meet the 25th percentile criterion by identifying a minimum of three other equivalent models that meet the functional needs of the facility with higher energy consumption requirements. If there are less than three other functionally equivalent models available on the market, use the most efficient available.

Reference Standards

EPA Energy Star® Program at www.energystar.gov.

Potential Technologies & Strategies

Purchase computers, related electronics, and office equipment that carry the Energy Star® label. Examples of these include:

- Computers and Monitors
- Copiers
- DVD Products
- Printers
- Refrigerators
- Scanners
- TVs & VCRs
- Water Coolers
- Commercial Solid Door Refrigerators and Freezers

EE Credit 3 continued

Energy Efficient Equipment

This is just a sampling of a steadily increasing list. Refer to EPA's Energy Star® Program at www.energystar.gov for an up to date list of product categories and models:

http://www.energystar.gov/index.cfm?fuseaction=find_a_product.

Investigate availability of Energy Star® qualified products for medical equipment purchases, particularly those items that are purchased or leased in quantity or represent particularly high electric consumption. Do market survey for best 25 percent equipment where equipment is not yet available with Energy Star® labeling. Examples of priority high load medical equipment to focus on include:

- Diagnostic imaging equipment (x-rays, MRIs, etc)
- Sterilization
- Physiological monitoring
- Laundry
- Dietary

1 point

EE Credit 4

Refrigerant Selection

Intent

Reduce ozone depletion and support early compliance with the Montreal Protocol.

Health Issues

Stratospheric ozone layer depletion leads to increased exposure to ultraviolet radiation, increasing risk factors for skin cancer and immune system depression. The United States is one of the world's largest emitters of ozone depleting substances. As part of the US commitment to implementing the Montreal Protocol, the EPA has implemented regulations relative to the responsible management of CFCs, including programs to end the production of ozone depleting substances.

Credit Goals

- Do not operate base building HVAC, refrigeration or fire suppression systems that contain HCFCs or Halons.

OR

- Reduce emissions of refrigerants from base cooling equipment to less than 3% of charge per year over the performance period using EPA Clean Air Act, Title VI, Rule 608 procedures governing refrigerant management and reporting and reduce the leakage over the remainder of unit life to below 25%.

Documentation

- q Document that base building HVAC&R systems do not use HCFCs or Halons.

OR

- q Document that emissions of refrigerants from base cooling equipment over the performance period are less than 3% of charge per year using EPA Clean Air Act, Title VI, Rule 608 procedures governing refrigerant management and reporting.

- q Verify that leakage over the remainder of unit life is being maintained below 25%.

Reference Standards

EPA Clean Air Act, Title VI, Rule 608 governing refrigerant management and reporting.

Potential Technologies & Strategies

Set up loss minimization procedures and systems to meet annual loss minimization standards and reporting requirements.

1-2 points

EE Credit 5.1**Performance Measurement: Enhanced Metering****Intent**

Demonstrate ongoing accountability and optimization of building energy and water consumption performance over time and add incentives for additional energy reduction.

Health Issues

Energy efficiency can enhance human health by reducing particulate, chemical and greenhouse gas emissions associated with fossil-fuel based combustion and electrical generation, thereby improving outdoor air quality and curbing global climate change.

Credit Goals

- Have in place over the performance period continuous metering for the following items: (Up to 2 points can be earned - one point is earned for each 4 actions implemented/maintained). For each item metered, prepare, implement and maintain a program for using the data gathered to improve building performance over time.
 - Lighting systems and controls.
 - Separate building electric meters that allow aggregation of all process electric loads.
 - Separate building natural gas meters that allow aggregation of all process natural gas loads.
 - Chilled water system efficiency at variable loads (kW/ton) or cooling loads (for non-chilled water systems).
 - Cooling load.
 - Air and water economizer and heat recovery cycle operation.
 - Boiler efficiencies.
 - Building specific process energy systems and equipment efficiency.
 - Constant and variable motor loads.
 - Variable frequency drive (VFD) operation.
 - Air distribution, static pressure and ventilation air volumes.

Documentation

- q For each item metered prepare a description of the performance improvement program implemented using the data gathered to improve system/building performance over time.
- q Prepare quarterly reports on the metered data gathered and for each item metered a report card of its performance. Document one day of actual output of all data recorded.

EE Credit 5.1 continued

Performance Measurement: **Enhanced Metering**

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Have in place over the performance period continuous metering for the identified categories of energy and system performance. For each item metered, prepare, implement and maintain a program for using the data gathered to improve building performance over time. IPMVP Volume I: Concepts and Options for Determining Energy Savings can be used to track energy savings of specific energy efficiency measures implemented in buildings.

1 point

EE Credit 5.2**Performance Measurement: Emission Reduction Reporting****Intent**

Reduce building energy use and associated emissions.

Health Issues

Energy efficiency can enhance human health by reducing particulate, chemical and greenhouse gas emissions associated with fossil-fuel based combustion and electrical generation, thereby improving outdoor air quality and curbing global climate change.

Credit Goals

- Identify building performance parameters that reduce energy use and reduce emissions.
 - Track and record the significant emission reductions including those delivered by energy efficiency, renewable energy and other building emission reduction actions including: carbon dioxide (CO₂), sulfur dioxide (SO₂), nitrogen oxides (NO_x), mercury (Hg), small particulates (PM_{2.5}), large particulates (PM₁₀), and volatile organic compounds (VOCs).
 - Report the reductions in emissions resulting from these energy efficiency and renewable operations using a third party voluntary certification program.
 - Retire at least 10% of the emission reductions, delivered by the energy efficiency actions through a third party voluntary certification program. (To meet this requirement the third party voluntary emission reduction certification and emission reduction retirement programs must be programs of credible organizations. Third party programs shall notify any applicable local or regional emission reduction registries of the reported emission reductions.)
 - Ask the suppliers of good and services for the building to do the same by implementing actions above.

Documentation

- q Compile reporting of all building performance parameters that reduce energy use and calculate the total savings for each type of energy reduction. Compile reporting of renewable energy use and other emission reduction actions.
- q Calculate and compile a reporting of the resulting reductions for the significant types of environmental emissions resulting from the energy efficiency operations and other emission reduction actions using the emission reduction calculation protocol of a third party voluntary certification program. Emission reductions to be tracked include: carbon dioxide (CO₂), sulfur dioxide (SO₂), nitrogen oxides (NO_x), mercury (Hg), small particulates (PM_{2.5}), large particulates (PM₁₀), and volatile organic compounds (VOCs).
- q Document the retirement of at least 10% of the emission reductions, delivered by the energy efficiency measures, renewable energy and other emission reduction actions, through a third party voluntary certification program.

EE Credit 5.2 continued

Performance Measurement: **Emission Reduction Reporting**

- q Ensure that the suppliers for fossil fuels have been asked to report energy savings, renewable energy use and other emission reduction actions. Report all types of resulting emissions reductions and retire at least 10% of these reductions through a third party voluntary certification program and ask their suppliers of goods and services to do the same.
- q Ensure that a third party voluntary certification program has notified any applicable local or regional emission reduction registries of the reported emission reductions.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Addressing all the significant pollutants for which reductions can be achieved through energy efficiency, renewable energy and other emission reduction activities is important because of the associated environmental and health effects specifically: carbon dioxide (CO₂), sulfur dioxide (SO₂), nitrogen oxides (NO_x), mercury (Hg), small particulates (PM_{2.5}), large particulates (PM₁₀), and volatile organic compounds (VOCs). Moreover, energy efficient strategies can be achieved at a low cost yielding significant emission reductions.

Water Conservation

Required

WC Prerequisite 1

Minimum Water Efficiency

Intent

Maximize fixture water efficiency within buildings to reduce the burden on potable water supply and wastewater systems.

Health Issues

Maintaining adequate potable water supplies is a basic necessity for the health of individuals and communities. Only about 1% of the water on Earth is freshwater. Processing potable water is energy intensive and thus contributes to air emissions associated with fossil fuel energy generation (for the treatment, pumping and maintenance of the potable water systems). Only about 20% of current urban water is used for drinking and sanitary purposes, with the other 80% not requiring treatment to potable standards. Using reclaimed water for selected applications can reduce costs and preserve precious potable water supplies. To protect the public health, a dual or dedicated distribution system must be installed to segregate potable and reclaimed water for health, product and process purposes.

Credit Goals

- Maximize fixture potable water efficiency to achieve a level equal to or below water use baseline, calculated as 120 percent of the water usage that would result if 100% of the total building fixture count were outfitted with plumbing fixtures that meet the Energy Policy Act of 1992 fixture performance requirements. If the building does not have separate metering for each water use (fixture use, process use, irrigation and other uses) the water use reduction achievements can be demonstrated with calculations. At least one meter for the overall building water use is required and metering for cooling towers and other process water uses are encouraged but not required.

Documentation

- q Document that the existing building fixture potable water use is equal to or less than a baseline calculated as 120% of the water usage that would result if 100% of the total building fixture count were outfitted with plumbing fixtures that meet the Energy Policy Act of 1992 fixture performance requirements.
- q Obtain quarterly and annual water meter data for the performance period for potable water use inside the building showing that the annual fixture potable water use is equal to or less than the calculated baseline.
- q Calculate fixture potable water use per occupant and per square foot.

WC Prerequisite 1 continued

Minimum Water Efficiency

Reference Standards

The Energy Policy Act (EPACT) of 1992, <http://tis.eh.doe.gov/nepa>.

Potential Technologies & Strategies

Reduce fixture potable water usage through automatic water control systems. Install, where possible, water conserving plumbing fixtures that meet or exceed Energy Policy Act of 1992 fixture requirements in combination with ultra high efficiency or dry fixture and control technologies.

1-2 points

WC Credit 1

Water Use Reduction: Water Efficient Landscaping

Intent

Provide for the ongoing optimization and conservation of building potable water consumption over time and in areas of the facility not otherwise impacted by construction.

Health Issues

Maintaining adequate potable water supplies is a basic necessity for the health of individuals and communities. Only about 1% of the water on Earth is freshwater. Processing potable water is energy intensive and thus contributes to air emissions associated with fossil fuel energy generation (for the treatment, pumping and maintenance of the potable water systems). Only about 20% of current urban water is used for drinking and sanitary purposes, with the other 80% not requiring treatment to potable standards. Using reclaimed water for selected applications can reduce costs and preserve precious potable water supplies. Eliminating potable water for irrigation systems is an important conservation strategy.

Credit Goals

- Use high-efficiency irrigation technology OR use captured rain or recycled site water to reduce potable water consumption for irrigation in comparison to conventional means of irrigation. Achieve reductions in potable water use for irrigation over conventional means of irrigation.

Credit 1.1 (1 point)	Adopt technologies and strategies to reduce potable water use for irrigation by 50%. Document the reductions from baseline.
Credit 1.2 (1 point)	Adopt technologies and strategies to reduce potable water use for irrigation by 100%. Document the reductions from baseline (additive to Credit 1.1).

- If the building does not have separate metering for each water use (fixture use, process use, irrigation and other uses) the water use reduction achievements can be demonstrated with calculations. At least one meter for the overall building water use is required (see WC Prerequisite 1). In urban settings, where there is no lawn, credits can be earned by reducing the use of potable water for watering any roof/courtyard garden space or outdoor planters.

Documentation

- q Compile a brief narrative description, system schematics, photographs and calculations demonstrating how much potable water use for irrigation is reduced in comparison to conventional means of irrigation.

WC Credit 1 continued**Water Use Reduction: Water Efficient Landscaping**

- q Describe the type of irrigation system that is "conventional" in the area and the extent that the "conventional" type of irrigation system is used in the area.
- q The head of facility management for the facility is required to sign off on the calculation of reduction in the amount of potable water used for irrigation.
- q Compile quarterly water meter readings over the performance period supporting the documentation of the reduction in potable water use for irrigation as well as quarterly reports over the performance period that document the maintenance activities implemented to ensure proper operation of the irrigation system.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Specify water-efficient, native or adapted, non-invasive climate tolerant plantings. Implement or maintain high efficiency irrigation technologies that include micro irrigation, moisture sensors, or weather data based controllers. Feed irrigation systems with captured rainwater, gray water (site or municipal), or on-site treated wastewater. Consider eliminating use of an irrigation system. Consider use of xeriscaping principles, particularly though not exclusively in dry/arid climates.

1-2 points

WC Credit 2**Building Water Use Reduction****Intent**

Maximize fixture water efficiency within buildings to reduce the burden on potable water supply and wastewater systems.

Health Issues

Maintaining adequate potable water supplies is a basic necessity for the health of individuals and communities. Only about 1% of the water on Earth is freshwater. Processing potable water is energy intensive and thus contributes to air emissions associated with fossil fuel energy generation (for the treatment, pumping and maintenance of the potable water systems). Only about 20% of current urban water is used for drinking and sanitary purposes, with the other 80% not requiring treatment to potable standards. Using reclaimed water for selected applications can reduce costs and preserve precious potable water supplies. To protect the public health, a dual or dedicated distribution system must be installed to segregate potable and reclaimed water for health, product and process purposes.

Credit Goals

- Have in place over the performance period strategies and systems that in aggregate produce a reduction of fixture potable water use from the calculated fixture water usage baseline established in WC Prerequisite 1. If the building does not have separate metering for each water use (fixture use, process use, irrigation and other uses) the water use reduction achievements can be demonstrated with calculations. At least one meter for the overall building water use is required and metering for cooling towers and other process water use encouraged but not required.

Credit 2.1 (1 point)	Adopt technologies and strategies to reduce fixture water use by 10%. Document the reductions from baseline.
Credit 2.2 (1 point)	Adopt technologies and strategies to reduce fixture water use by 20%. Document the reductions from baseline (additive to Credit 2.1).

Documentation

- q Verify (calculations, fixture cut sheets, results of direct measurement and photographs) that the existing building fixture potable water use over the performance period is less than the baseline established in WC Prerequisite 1.
- q Compile quarterly and annual water meter data for water use in the building supporting the documentation of the annual fixture potable water use over the performance period.

WC Credit 2 continued

Building Water Use Reduction

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Reduce fixture water usage through automatic controls and other actions. Specify water conserving plumbing fixtures that exceed Energy Policy Act of 1992 fixture requirements in combination with ultra high efficiency or dry fixture and control technologies.

1-3 points

WC Credit 3
Process Water Efficiency

Intent

Reduce process potable water use and process wastewater generation.

Health Issues

Maintaining adequate potable water supplies is a basic necessity for the health of individuals and communities. Only about 1% of the water on Earth is freshwater. Processing potable water is energy intensive and thus contributes to air emissions associated with fossil fuel energy generation (for the treatment, pumping and maintenance of the potable water systems). Only about 20% of current urban water is used for drinking and sanitary purposes, with the other 80% not requiring treatment to potable standards. Using reclaimed water for selected applications can reduce costs and preserve precious potable water supplies. To protect the public health, a dual or dedicated distribution system must be installed to segregate potable and reclaimed water for health, product and process purposes.

Approximately 70% of the potable water consumption in health care facilities is attributable to process water uses, compared to less than 30% consumed for “domestic” use. Reduction of potable water use for process water applications is an important component of water conservation measures in this sector.

Credit Goals

- Process water is defined as water used for non-sanitary purposes. Examples of process water use in a health care facility include imaging equipment, microscopes, decontamination equipment, other diagnostic and lab equipment, dietary equipment and laundry facilities.

Credit 3.1 (1 point)	Adopt technologies and strategies to reduce process water use and process wastewater generation by 20%. Document the reductions from baseline.
Credit 3.2 (1 point)	Adopt technologies and strategies to reduce process water use and process wastewater generation by 30%. Document the reductions from baseline. (additive to credit 3.1)
Credit 3.3 (1 point)	Adopt technologies and strategies to reduce process water use and process wastewater generation by 40%. Document the reductions from baseline. (additive to Credits 3.1 and 3.2)

Documentation

- q Compile documentation establishing a baseline process water use budget, and the calculations indicating percentage reduction relative to baseline.

WC Credit 3 continued

Process Water Efficiency

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Employ methodologies based on Pollution Prevention hierarchy – reduce, reuse, recycle. Treat process wastewater (boiler blowdown, for instance) or capture condensate from air conditioning cooling coils so that it can be downcycled for use in cooling towers, irrigation, etc. Reduce water used for wash-up by using efficient floor wash machines instead of hosing.

Consider water reduction strategies for high use processes such as food service and laundry. Some hospitals are implementing programs to reduce laundry volumes through more selective linen changes, resulting in savings of 20%- 30% of laundry water volumes.

1 point

WC Credit 4Performance Measurement: **Enhanced Metering****Intent**

Provide for the ongoing optimization and conservation of potable water consumption over time and in areas of the facility not otherwise impacted by construction.

Health Issues

Maintaining adequate potable water supplies is a basic necessity for the health of individuals and communities. Only about 1% of the water on Earth is freshwater. Processing potable water is energy intensive and thus contributes to air emissions associated with fossil fuel energy generation (for the treatment, pumping and maintenance of the potable water systems). Only about 20% of current urban water is used for drinking and sanitary purposes, with the other 80% not requiring treatment to potable standards. Using reclaimed water for selected applications can reduce costs and preserve precious potable water supplies. To protect the public health, a dual or dedicated distribution system must be installed to segregate potable and reclaimed water for health, product and process purposes.

Credit Goals

- Employ strategies for long term continuous measurement of potable water uses within the facility. Install metering devices to measure potable water use, as applicable to the facility. One point is earned for installation in a minimum of 3 locations:
 - Water use in laboratory
 - Water use in dietary department
 - Water use in central sterile and processing department
 - Water use in laundry
 - Water use in radiology and imaging department
 - Water use in surgical suite
 - Purified water system (reverse osmosis and/or deionized) and filter backwash water
 - Outdoor irrigation systems
 - Cooling tower make-up and filter backwash water
 - Steam boiler system make-up water
 - Closed loop hydronic system make-up water
 - Water use in mechanical equipment, including pumps.

WC Credit 4 continued

Performance Measurement: **Enhanced Metering**

Documentation

- cq Establish and implement a Measurement & Verification Plan.
- cq Include a summary schedule of the instrumentation and controls for the required monitoring categories, highlighting the input/output (I/O) data points to be collected.
- cq Document the monitoring system, including cut sheets of sensors and the data collection system.

Reference Standards

International Performance Measurement and Verification Protocol Volume 1, 2001 Version,
<http://www.ipmvp.org/>.

Potential Technologies & Strategies

Install submeters to measure potable water systems in areas of the facility not included in construction project scope. Use measured system data to identify opportunities to reduce potable water use.

Chemical Management

Required

CM Prerequisite 1

Polychlorinated Biphenyl (PCB) Removal

Intent

Reduce the potential exposure of building occupants to PCBs and PCB combustion by-products in case of fire in the building.

Health Issues

The 209 chemicals classified as PCBs are persistent, bioaccumulative, and toxic chemicals (PBTs). PCBs are associated with a variety of adverse health effects, including cancer and effects on the immune, reproductive, nervous, and endocrine systems. These can occur even with very low exposure levels. The 1996 U.S. EPA reassessment of PCBs determined that PCBs are probable human carcinogens; other agencies, including the International Agency for Research on Cancer, the National Toxicology Program, and the National Institute for Occupational Safety and Health, have reached similar conclusions.

Credit Goals

- Establish a PCB management program.
- Identify the applicable regulatory requirements.
- Have a current survey that identifies where PCBs are located in the building and on the site so that the PCBs present can be addressed appropriately in the ongoing PCB management program.

Documentation

q Verify that PCB-containing materials are not present in the building or on the site.

OR

- q Compile the current PCB management program that identifies the applicable regulatory requirements and explains how the program is addressing PCBs remaining in the building on an ongoing basis.
- q Review the past PCB work done on the building and on the building site and use these data to prepare the history-based component of the PCB survey for the building and the site, collecting the available information on: (1) where PCBs have been removed; (2) where PCBs remain; and (3) how the remaining PCBs are being addressed.
- q Update the PCB survey for the building and the site with current information by: (1) sampling additional likely locations in building and on the site for PCBs; and (2) testing samples to see if PCBs are present.
- q If the survey identifies any new locations with PCBs, add these to the description of how the PCB management program is addressing PCBs remaining in the building on an ongoing basis.

Reference Standards

There is no reference standard for this credit.

CM Prerequisite 1 continued

Polychlorinated Biphenyl (PCB) Removal

Potential Technologies & Strategies

Review the current PCB management program, and prepare a description of the program that identifies the applicable regulatory requirements and explains how the program will address PCBs remaining in the building on an ongoing basis.

Review PCB work done in the building and on the building site and use these data to prepare the history-based component of the PCB survey by collecting the available information on: (1) where PCBs have been removed; (2) where PCBs remain; and (3) how the remaining PCBs are being addressed.

Update this survey with current information by: (1) sampling additional likely locations in the building and on the site for PCBs; and (2) testing samples to see if PCBs are present. If the survey identifies any new locations with PCBs, add these to the description of how the PCB management program is addressing PCBs remaining in the building on an ongoing basis.

1 point

CM Credit 1.1

Community Contaminant Prevention: **Airborne Releases**

Intent

Minimize building airborne effluents and environmental, health and safety burdens to site and neighbors.

Health Issues

Health care facilities often include laboratories, pharmacies, and diagnostic services that generate substances toxic to patients, staff, visitors, and neighboring communities. Minimizing or containing such emissions protects human health and the environment from exposure to these toxic substances.

Credit Goals

- Exceed by 10% the NIH-CDC Guidelines for Airborne Effluent from Laboratories that Handle Biohazards (CDC-NIH Biosafety in Microbiological and Biomedical Laboratories, latest edition (currently May 1999).
- Meet all standards of California South Coast Air Quality Management District for all products of combustion.
- Obtain low sulfur diesel or bio-diesel fuels for generators and other diesel equipment.

Documentation

- ❑ Verify from the mechanical engineer of record that the NIH-CDC Guidelines for Airborne Effluent from Laboratories that Handle Biohazards have been exceeded by 10% and all California South Coast Air Quality Management District standards for products of combustion have been met.
- ❑ Review purchasing records on diesel fuel purchases to verify purchase of low sulfur or bio-diesel fuel.

Reference Standards

National Institutes for Health-CDC Guidelines for Airborne Effluent from Laboratories that Handle Biohazards (CDC-NIH Biosafety in Microbiological and Biomedical Laboratories, latest edition (currently May 1999).

California South Coast Air Quality Management District, <http://www.aqmd.gov>.

Potential Technologies & Strategies

- Maintain scrubbers and filters for boilers and diesel generators.
- Test and recertify all filters annually.
- Burn fuels low in sulfur content. Provide air quality abatement equipment for equipment that burns fossil fuels.
- Burn bio-diesel fuels in lieu of fossil fuels.

1 point

CM Credit 1.2

Community Contaminant Prevention: Leaks & Spills

Intent

Prevent releases of hazardous chemicals and fuels to storm sewer.

Health Issues

Health care facilities store and manage hazardous chemicals in underground tanks and other outdoor facilities, potentially risking contamination of aquifers and stormwater. By minimizing these risks, health care facilities can contribute to protecting the health of the surrounding community.

Credit Goals

- Develop and implement a policy to use containment and engineering controls to manage outdoor storage of fuels and chemicals in order to minimize risk from leakage and spills.

Documentation

- Compile outdoor chemical storage policy and procedures, a plan indicating the location of all storage facilities, and a narrative describing secondary containment provisions.

Reference Standards

Title 40, Code of Federal Regulations, Part 112 (for spill control and countermeasures).

Potential Technologies & Strategies

Develop a facility wide policy governing the controlled and secure outdoor storage of hazardous chemicals and fuels, both for incoming deliveries and outgoing waste products. Ensure that storage facilities include secondary containment provisions to prevent unintentional spills and leakage from contaminating aquifers and stormwater.

1 point

CM Credit 2

Indoor Pollutant Source Control: **High Hazard Chemicals**

Intent

Avoid exposure of building occupants to potentially hazardous indoor pollutants and chemicals that adversely impact air quality and human health.

Health Issues

Hospitals are particularly vulnerable to indoor air quality threats, as many building occupants are immunocompromised and have increased chemical susceptibilities. Equally important, the Joint Commission on the Accreditation of Healthcare Organizations (JCAHO) has expressed heightened concern over increasing respiratory issues among health care workers. JCAHO has identified indoor chemical pollutants as a contributing factor to indoor air quality concerns, including photocopiers, glutaraldehyde and ethylene oxide sterilants, xylene, aerosolized medication distribution systems, anesthetic gases, chemotherapeutic agents, latex, cleaners and floor finishes.

Credit Goals

- Develop a policy for receiving, handling, storing and disposing of high hazard substances. Include the purchasing department in developing standards for evaluating hazardous chemicals prior to purchase. These substances may include:
 - fixer and developer baths from X-ray departments
 - heavy-metal-based compounds containing silver, lead, copper, cadmium, chromium, mercury, or manganese
 - reactive/explosive substances such as azides and peroxide compounds such as hydrogen peroxide, perchloric acid, peracetic acid, and perborates
 - hazardous microbiological cultures, dyes and solvents (e.g., gentian violet)
 - tissue fixing chemicals (e.g., osmium tetroxide, aldehydes or ethidium bromide used in genetic analysis)
 - substances from nuclear medicine/radiology (e.g., radioactive substances and iodoorganic contrast media)
 - used oil, thinners, varnish, and paint residues
 - concentrates of disinfectants and cleaning agents, bleaches and detaching agents
 - solvent mixtures (e.g., turpentine and nitro thinners)
 - sterilization gases (e.g., ethylene oxide)
 - anesthesia gases
 - formaldehyde (formalin), ethanol, and xylene from pathology operations

CM Credit 2 continued

Indoor Pollutant Source Control: **High Hazard Chemicals**

- Minimize the use of hazardous chemicals in specific applications:
 - Substitute glutaraldehyde (GA) and Ethylene Oxide (EtO) sterilants when safer alternatives that maintain infection control standards are available.
 - Where glutaraldehyde must be used, ensure that enclosed reprocessing units limit the Threshold Limit Value (TLV – 15 min STEL) to 0.05 ppm or less.
 - Install controls for all high level chemical disinfectants and sterilants consistent with a presumption of high hazard.

Documentation

- ❑ Document policy regarding receiving, handling, storage and disposal of high hazard substances. Develop a registry of environmentally hazardous substances and materials, indicating the name of the compound, hazardous classification, usage and quantities, safety and environmental precautions, waste disposal requirements, and monitoring requirements.
- ❑ Document policy mandating elimination of glutaraldehyde and ethylene oxide or compliance with American Congress of Government Industrial Hygienists (ACGIH) Threshold Limit Value of 0.05 ppm.
- ❑ Compile an Indoor Air Quality (IAQ) Plan indicating routine review of locations of sterilization equipment, copiers, and other indoor pollutant sources to ensure that IAQ will be maintained.
- ❑ Include review of equipment locations as part of the initial building commissioning plan. Periodically monitor locations of installations of all portable sterilizing equipment.

Reference Standards

American Congress of Government Industrial Hygienists (ACGIH), www.acgih.org.

Potential Technologies & Strategies

Health care organizations should seek least toxic alternatives to processing equipment chemical use, including phasing out the use of glutaraldehyde, xylene, and other chemicals used in sterilization processes.

Develop material handling and processing guidelines as a part of an environmental management system, and monitor implementation of guidelines as a part of final building commissioning. Guidelines should reduce consumption of hazardous materials, and prevent potential contamination of the surrounding environment. Consider providing dedicated centralized areas for receipt of, return of, and/or safe disposal of, hazardous materials. Also consider providing dedicated space in each lab for receipt of, return of, and/or safe disposal of, hazardous materials.

CM Credit 2 continued

Indoor Pollutant Source Control: **High Hazard Chemicals**

Include an area for reporting of all hazardous material “transactions” to central inventory system. Develop decanting procedures that eliminate waste or allow for recycling of waste streams. Minimize proliferation of hazardous materials in laboratories by developing “just in time” inventory system.

Provide coordinated materials transport strategy that allows efficient “just in time” delivery of hazardous materials. Use alternative equipment or laboratory methods designed to reduce consumption of hazardous materials.

Resources

Greener Hospitals: Improving Environmental Performance, Edited by: Environment Science Center, Augsburg, Germany with support of Bristol-Myers Squibb (www.wzu.uni-augsburg.de/Publikationen/WZU_Publikationsreihe.html).

1 point

CM Credit 3.1**Chemical Discharge: Chemical Waste Minimization Plan****Intent**

Protect natural habitat, waterways and water supply from pollutants carried by building discharge water.

Health Issues

The chemical composition of wastewater can have varying concentrations of specific chemicals that may represent exposure risks to aquatic ecosystems and public health. Wastewater from a 'typical' clinical laboratory could contain ionic mercury and organomercuric compounds, other heavy metals, organic chemicals, formaldehyde, blood products and body fluids and particulate matter, for example.

Credit Goals

- Protect municipal sewage treatment works from pollutant discharge from building operations.
- Prepare a chemical waste minimization plan to minimize or eliminate chemical waste drainage to the sanitary sewer system that includes:
 - A listing of chemical products and systems for the evaluation and implementation of least toxic alternatives. Priority areas include: Dialysis, Environmental Services, Facilities Management/Engineering, Laboratory/Pathology/Histology, Nutrition Services, Pharmacy, Radiology, Sterile Processing, Laundry and Surgical Services.
 - A description of chemical storage areas and description and implementation of secondary containment.

Documentation

- q Prepare a statement from a responsible party establishing the elimination of chemical waste to drain in cooling tower blowdown and/or boiler blowdown; prepare drawings and equipment specifications.
- q Compile regulations of the relevant Water & Sewer Utility indicating the maximum acceptable levels of effluent permitted.
- q Compile testing records, made quarterly for one year, showing compliance with the Credit Goals.
- q Develop an action plan to eliminate, minimize, substitute, recycle, and dispose of harmful chemicals safely, improving distribution, and limiting quantities, storage and waste.

Reference Standards

There is no reference standard for this credit.

CM Credit 3.1 continued

Chemical Discharge: **Chemical Waste Minimization Plan**

Potential Technologies & Strategies

A hospital's main wastewater discharge flow may not warrant pre-treatment (except neutralization or radioactive decontamination). However, partial flows from hospital functional areas (e.g., laboratories, oncology, and pathology) should be carefully evaluated for opportunities to reduce discharge and improve quality.

Emphasize source reduction from discharge of all hazardous chemicals. Sources of toxic chemicals from health care facilities include infectious substances, laboratory discharge, building system operations, housekeeping (e.g. solvents and disinfectants), food services (e.g. soaps, chlorine), and diagnostic and treatment areas (e.g. glutaraldehyde, radioactive substances). In principle, it should always be assumed that waste materials, until properly evaluated, should not be disposed of in the wastewater system.

Minimize use of hazardous materials in relationship to testing and experimental volume.

Use automated laboratory equipment that maximizes sample throughput while minimizing sample size, reagent quantity, and waste streams. Work with EHS personnel and wastewater authorities in developing action plan.

Explore technologies and strategies to eliminate chemical waste to drain in cooling tower and boiler blowdown. Treat blowdown so that chemical treatment can be reclaimed for re-use.

Take steps to prevent accidental discharges to drain, such as raised lips around cup sinks, working over trays.

Use non-chemical water treatments such as ozonation or ultraviolet radiation.

Hospitals are one of the few known sources of the heavy metal gadolinium (from nuclear magnetic resonance imaging) in wastewater. Little is known about gadolinium's environmental impact.

Discharging concentrates of disinfecting and cleaning agents should be avoided — particularly chlorine, phenols, quaternary ammonium compounds, and products containing nonylphenol (potentially estrogenic effect) and strong cleaning ingredients.

Resources

Hospitals for a Healthy Environment (H2E) has published materials to assist in the development of a chemical minimization plan, www.h2e-online.org/tools/chemical.htm.

Medical, Academic and Scientific Community Organization (MASCO), Boston, MA: Mercury Work Group, www.masco.org/mercury/techid/types.html.

Greener Hospitals: Improving Environmental Performance, Edited by: Environment Science Center, Augsburg, Germany with support of Bristol-Myers Squibb (www.wzu.uni-augsburg.de/Publikationen/WZU_Publikationsreihe.html).

1 point

CM Credit 3.2

Chemical Discharge: **Pharmaceutical Waste Discharge**

Intent

Reduce pharmaceutical wastes in sanitary sewer discharge.

Health Issues

A study by the US Geological Survey found pharmaceutical residue in 80% of water tested in the U.S. in testing conducted in 1999 and 2000. The chemical composition of wastewater can have varying concentrations of specific chemicals that may represent exposure risks to aquatic ecosystems and public health. Wastewater treatment facilities were not designed to treat pharmaceutical wastes. Many are hazardous; antibiotics and hormones affect species downstream of treatment facilities.

Credit Goals

- Develop an integrated pharmaceutical waste management system in which all waste bulk chemotherapy items are segregated and managed as hazardous waste, all other waste pharmaceuticals are segregated into hazardous or non-hazardous waste, and no antibiotics, hormones or other pharmaceutical waste is drain disposed to the sanitary sewer system.
- Develop a pharmaceutical waste minimization plan that includes:
 - Non-hazardous pharmaceutical waste: Segregate into dedicated containers for disposal at a regulated landfill permitted to accept non-hazardous pharmaceutical waste.
 - Non-chemotherapy pharmaceutical waste that meets the definition of a hazardous waste: Identify, segregate, label, store, and manage as hazardous waste as defined in the Resource Conservation and Recovery Act (RCRA).
 - Bulk chemotherapy waste: Segregate from trace chemotherapy waste, label, store, and manage bulk chemotherapy waste as hazardous waste as defined in the RCRA.

Documentation

- q Compile and maintain an Integrated Pharmaceutical Waste Management Plan that addresses the above Credit Goals.
- q Document the process used to dispose of all regulated pharmaceutical waste items.

Reference Standards

Resource Conservation Recovery Act (RCRA) is described at <http://www.epa.gov/rcraonline/>.

Potential Technologies & Strategies

Examine all non-hazardous pharmaceutical waste and segregate it into dedicated containers for disposal at a regulated landfill permitted to accept non-hazardous pharmaceutical waste.

Uncontrolled disposal of mercury-containing drugs, diagnostic agents (e.g., Thiomersal®), disinfectants (e.g., Merbromin®, Mercurochrome® and Nitromersol®), and diuretic agents (e.g., mercurphyllin) should be avoided.

CM Credit 3.2 continued

Chemical Discharge: **Pharmaceutical Waste Discharge**

Resources

Hospitals for a Healthy Environment (H2E) has published materials to assist in the development of a chemical minimization plan, <http://www.h2e-online.org/tools/chemical.htm>.

U.S. EPA <http://web.archive.org/web/20030627025308/www.epa.gov/esd/chemistry/ppcp/greenpharmacy-intro.htm>.

Greener Hospitals: Improving Environmental Performance, Edited by: Environment Science Center, Augsburg, Germany with support of Bristol-Myers Squibb (www.wzu.uni-augsburg.de/Publikationen/WZU_Publikationsreihe.html).

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Waste Management

Required

WM Prerequisite 1

Waste Stream Audit

Intent

Establish minimum source reduction and recycling program elements and quantify current waste stream production volume.

Health Issues

Since the 1998 Memorandum of Understanding between the U.S. EPA and the American Hospital Association mandating a 33% reduction in total waste volumes by 2005 and 50% by 2010, hospitals have initiated ambitious waste sorting and recycling programs. In response to the 1996 EPA finding that medical waste incineration was the leading contributor to dioxin emissions in the United States, many hospitals have dramatically reduced the volume of medical waste that is incinerated, and have installed alternative technologies on site. Moreover, hospitals are returning to the use of reusable rather than disposable products, which reduces reliance on waste processing systems. Each of these responses reduces the release of highly toxic chemicals into the environment.

Initiating and implementing a Waste Management Plan generates cost savings, as tipping fees for waste disposal continue to increase. Reducing medical waste volumes lowers disposal costs, while proper waste stream management allows for safer, effective disposal methods.

Credit Goals

- Conduct a waste stream audit of the ongoing waste stream to establish a current baseline identifying the types and amounts of waste stream constituents. At a minimum, the audit should determine the amounts for paper, glass, plastics, cardboard, regulated medical waste, hazardous waste and metals in the waste stream. Operate over the performance period a procurement/management policy to reduce waste stream through purchasing strategies, collection station equipment and occupant education.

Documentation

- q Complete the waste stream audit to establish building waste baseline.
- q Compile the procurement/management policy implemented to reduce waste stream through purchasing strategies, collection station equipment and occupant awareness notices.

WM Prerequisite 1 continued

Waste Stream Audit

Potential Technologies & Strategies

Develop a plan to reduce the building's waste stream. Start by conducting a waste stream audit to establish a current baseline. Then evaluate how each type of waste identified in the waste stream can be reduced through source reduction, reuse and recycling.

Finally develop, implement and maintain the building's waste reduction plan including procurement/management policies to reduce waste stream through purchasing strategies, reuse and recycling, collection station equipment and agreements, and occupant education needed for the successful achievement of the waste reduction goals.

The waste reduction plan should include consideration of the following:

- avoiding waste by modifying a process/procedure (for example, emphasize electronic rather than paper record-keeping systems)
- buying environmentally-friendly products
- managing waste (separation of different kinds of waste; recycling)
- examining materials to see if they pose a potential environmental or health risk prior to their purchase and use
- reducing the amount of products and equipment containing chlorinated polymers (e.g., neoprene, polyvinyl chloride (PVC), chlorinated polyvinyl chloride, chlorinated polyethylene (CPE), Chlorosulfonated polyethylene (CSPE))
- identifying toxic substances, including lab chemicals and reducing the amount used, particularly those chemicals classified as persistent, bioaccumulative and toxic chemicals (PBTs)
- evaluating waste and waste sources regularly and looking for markets for waste products

Resources

Chapter 5, *Greener Hospitals: Improving Environmental Performance*, Edited by: Environment Science Center, Augsburg, Germany with support of Bristol-Myers Squibb (www.wzu.uni-augsburg.de/Publikationen/WZU_Publikationsreihe.html).

3 points

WM Credit 1
Total Waste Reduction

Intent

Reduce solid waste disposal in landfills and incinerators generated by health care facilities through reduction, reuse, recycling and composting.

Health Issues

Since the 1998 Memorandum of Understanding between the U.S. EPA and the American Hospital Association mandating a 33% reduction in total waste volumes by 2005 and 50% by 2010, hospitals have initiated ambitious waste sorting and recycling programs. In response to the 1996 EPA finding that medical waste incineration was the leading contributor to dioxin emissions in the United States, many hospitals have dramatically reduced the volume of medical waste that is incinerated, and have installed alternative technologies on site. Moreover, hospitals are returning to the use of reusable rather than disposable products, which reduces reliance on waste processing systems. Each of these responses reduces the release of highly toxic chemicals into the environment.

Initiating and implementing a Waste Management Plan generates cost savings, as tipping fees for waste disposal continue to increase. Reducing medical waste volumes lowers disposal costs, while proper waste stream management allows for safer, effective disposal methods.

Credit Goals

- Have in place over the performance period a Waste Management Plan and implementation strategies to prioritize reduction, reuse, recycling, and composting to divert wastes from disposal in landfills and incinerators.
- Incorporate steps into the facility's Waste Management Plan to eliminate, minimize, substitute and safely dispose of wastes generated by the facility using reduction of disposables and single use devices.
- Incorporate steps into the facility's Waste Management Plan that address the separation, collection and storage of materials for recycling, including (at a minimum) paper, glass, plastics, cardboard/OCC, metals, batteries and fluorescent lamps. The Plan should be designed to collect and recycle a minimum of 95% of batteries and a minimum of 95% of fluorescent lamps discarded. Each time reusable architectural elements, such as panels, are moved and reinstalled, they can be counted as part of the total waste stream and included in the recycled component of the waste stream.
- Incorporate steps into the facility's Waste Management Plan to implement best available technology (BAT) alternatives to incineration

AND

WM Credit 1 continued

Total Waste Reduction

- For existing health care facilities, reduce total waste below 1998 levels as indicated in the table which follows (by weight or volume):

Credit 1.1	Reduce 30% of total waste stream
Credit 1.2	Reduce 40% of total waste stream (1 point in addition to 1.1)
Credit 1.3	Reduce 50% of total waste stream (1 point in addition to 1.2)

Documentation

- q Complete the Waste Management Plan, highlighting the types and volumes or weights of total wastes generated, and the volumes or weights of regulated medical waste, demonstrating compliance with above.
- q Compile a copy of the organizational recycling policy.
- q Compile quarterly summary reports on the total waste produced by the building along with hauler documentation and calculations of the amount of each type of waste that has been disposed of or recycled over the performance period.

Reference Standards

The American Hospital Association (AHA) and the United States Environmental Protection Agency (EPA) signed a Memorandum of Understanding identifying goals to reduce the impact of health care facilities on the environment, including specific waste reduction goals. <http://www.h2e-online.org/about/mou.htm>.

Potential Technologies & Strategies

The waste management plan should stipulate the categories and volumes of waste for disposal and the methods of handling and disposal of each type of waste. At a minimum, the Plan should consider general trash, medical and infectious wastes, and hazardous waste. The plan should outline waste reductions achieved through environmentally preferable purchasing strategies, such as reduction of single use devices.

Provide dedicated central areas for receiving, returning, and/or safely disposing of hazardous materials. Segregate and secure biohazardous and environmentally hazardous materials, including mercury, nuclear reagent waste and other regulated waste types.

Operational strategies include, for example, installation of reusable sharps containers, substitution of reusable versus disposable food service products and Operating Room instruments and linens, substitution of reusable for disposable gowns, reduction in packaging waste through specific contractual terms with supply vendors.

WM Credit 1 continued

Total Waste Reduction

Assess all commodities received to reduce or eliminate unnecessary packaging, e.g., purchase bulk shipments in large containers rather than individual packaging, investigate shrink-wrapped shipment rather than elaborate boxing. Encourage vendors to creatively reduce their packaging and specify as a purchasing preference.

Resources

Hospital Waste Reduction, California Integrated Waste Management Board, February 1999.
www.ciwmb.ca.gov.

2 points

WM Credit 2

Regulated Medical Waste Reduction

Intent

Reduce solid waste disposal in landfills and incinerators generated by health care facilities through reduction, reuse, recycling and composting.

Health Issues

In response to the 1996 EPA finding that medical waste incineration was the leading contributor to dioxin emissions in the United States, many hospitals have dramatically reduced the volume of medical waste that is incinerated, and have installed alternative technologies on site. Moreover, hospitals are returning to the use of reusable rather than disposable products, which reduces reliance on waste processing systems. Each of these responses reduces the release of highly toxic chemicals into the environment.

Reducing medical waste volumes lowers disposal costs, while proper waste stream management allows for safer, effective disposal methods.

Credit Goals

Credit 2.1 - 1 point

- Demonstrate that total regulated medical waste volume or weight is less than 10% of the solid waste stream from the facility.

Credit 2.2 - 1 point

- Demonstrate that incineration is used only to dispose of the fraction of the regulated medical waste stream required by regulations to be incinerated. (Pyrolysis is not considered an acceptable alternative to incineration.)

Documentation

- ❑ Review the Waste Management Plan, highlighting the types and volumes or weights of total wastes generated, and the volumes or weights of regulated medical waste, demonstrating compliance with above.
- ❑ Document on-site alternative (non-incineration and non-pyrolysis) medical waste treatment technologies and a description of the technology selected **OR** obtain a contract with a provider for off-site alternate (non-incineration and non-pyrolysis) technology waste treatment.

Reference Standards

1998 Memorandum of Understanding (MOU) between American Hospital Association (AHA) and the U.S. EPA identifies pollution prevention goals for health care facilities, including waste reduction goals. <http://www.h2e-online.org/about/mou.htm>

WM Credit 2 continued

Regulated Medical Waste Reduction

Potential Technologies & Strategies

Assess all red bag generating locations and maximize reduction opportunities. Assess each location for detailed function. Provide adequate training for all staff to ensure only appropriate discards are disposed in red bags. Remove unnecessary red bag receptacles as they will encourage inappropriate disposal.

Resources

Non-Incineration Medical Waste Treatment Technologies, Health Care Without Harm, August 2001.
www.noharm.org.

1 point

WM Credit 3
Food Waste Reduction

Intent

Reduce solid waste disposal in landfills and incinerators generated by health care facilities through reduction, reuse, recycling and composting.

Health Issues

A 1998 Memorandum of Understanding between the U.S. EPA and the American Hospital Association targeted a 33% reduction in total waste volume by 2005; 50% by 2010. Food and organics are the second largest constituent of the health care waste stream, comprising close to 20% of the solid waste volume in medical facilities with food service operations.

A significant strategy to divert waste constituents from disposal while also contributing to ecosystem health is through beneficial reuse of organic matter. Composting organic matter and applying it to the soil increases soil micronutrients, and reduces reliance on chemical fertilizers and their associated industrial, ecologic and health burdens.

Credit Goals

- Develop a food waste diversion and collection plan, consistent with health and solid waste regulations, for all food use areas including but not limited to: catering, patient rooms, cafeteria and food preparation areas.
- Divert a minimum of 75% of food service organic waste by weight from the solid waste stream. Diversion may include any combination of animal feed, compost or donation. Provide controlled areas to facilitate easy removal of food waste, consistent with facility Integrated Pest Management (IPM) plan.

Documentation

- Prepare a space program and plan showing the area(s) dedicated to food waste collection and storage (and composting if applicable).
- Prepare a copy of contract(s) with food waste hauler (or others) demonstrating compliance with the intent of this credit.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Include the requirements associated with the food waste collection system in the space program, including storage spaces. Determine size of spaces based upon volume of projected waste and length of time anticipated for storage. Consider Integrated Pest Management issues in design.

Consider implementation of on-site composting programs for kitchen and food wastes, or contract with private or municipal compost ventures or farmers for handling of food waste.

Consider donation of unused foods to local food banks and/or related organizations.

Environmental Services

2 points

ES Credit 1

Outdoor Grounds & Building Exterior Management

Intent

Encourage grounds/site/building exterior management practices that preserve ecological integrity, enhance biodiversity and protect wildlife while protecting the health of building occupants.

Health Issues

Building occupants' health can be directly impacted by the use of pesticides, including herbicides, insecticides, fungicides, and termiticides, and toxic snow removal chemicals. In health care environments, pesticides applied outdoors can impact indoor air quality when applied proximate to air intakes and by being tracked inside on shoes and equipment. Many chemicals commonly used on health care facility grounds have not been tested for their low-level, long-term health impacts. Some pesticides are included on Persistent Bioaccumulative and Toxic Chemical (PBT) lists for avoidance.

Credit Goals

- Have in place over the performance period a low-impact site and green building exterior management plan that addresses the topics listed below. One point is earned for each four items addressed:
 - Maintenance equipment
 - Plantings
 - Animal and vegetation pest control
 - Landscape waste
 - Fertilizer use
 - Snow removal (where applicable)
 - Cleaning of building exterior
 - Paints and sealants used on building exterior
 - Other maintenance of the building exterior

Documentation

- q Compile a narrative overview of an organizational management plan for establishing/maintaining a low-impact site and building exterior plan that addresses and specifically highlights the actions from the list in the Credit Goals that are being implemented.
- q Compile quarterly reports over performance period documenting that this management plan is being implemented on an ongoing basis.

ES Credit 1 continued

Outdoor Grounds & Building Exterior Management

Reference Standards

Potential Technologies & Strategies

Have in place over the performance period a low-impact site and green building exterior management plan that addresses overall site management practices, chemical/fertilizer/pest management/snow removal practices, building exterior cleaning and maintenance practices.

Prepare plan for establishing and maintaining a least toxic grounds management strategy that includes the implementation of IPM and Plant Health Care (PHC) programs.

Use indigenous and/or drought-tolerant plants that are naturally resistant and that provide food for wildlife. Provide water sources for wildlife drinking and bathing unless doing so would enhance rodent or other pest populations or would encourage wildlife in the vicinity of the facility. Implement low impact fertilizer programs.

Integrated Pest Management (IPM) is a coordinated approach to pest control that seeks to prevent unacceptable levels of pests by the most cost-effective means with the least possible hazard to building occupants, workers, and the environment. The focus of IPM is on non-chemical prevention of pest problems. IPM emphasizes consideration of all management options. Preferential management methods include cultural, mechanical, physical, and biological controls, with a least hazardous pesticide used only as a last resort. "Least toxic" pesticides refers to those that have low or no acute or chronic toxicity to humans, affect a narrow range of species, and are formulated for application in a manner that limits or eliminates exposure of humans and other non-target organisms. See EPA website for list of pesticides (www.epa.gov/pesticides/ipm/).

Also include green landscape management actions, such as using a greater variety of plants, using more native plants, reducing size of lawns, changing maintenance practices, reducing the use of power equipment, stormwater control, using fertilizer on an as-needed basis, composting waste, applying Integrated Pest Management, creating wildlife habitat, avoiding/removing invasive plants, protecting natural areas and using plants to reduce building heating and cooling needs.

Plant health care management is a concept in managing landscape developed from Integrated Pest Management. PHC emphasizes plant health and horticultural practice, recognizing that health is impacted not only by pests, but improper irrigation, compacted soils, and other landscape conditions. In landscape maintenance, keep vegetation, shrubs and mulch a minimum of 1' away from structures. Apply organic fertilizers several times annually rather than a single, heavy application. Use methods of spot treatment of non-toxic or least toxic pesticides rather than area wide applications. Use mulching mowers to significantly reduce yard waste generation, fertilizer needs and water consumption through retention of organic matter.

Investigate least toxic snow removal strategies (including snowmelt piping, canopies or covered walkways) and identify low impact sites for dumping snow.

Include green cleaning and maintenance practices and materials that minimize environmental impacts in the green building exterior management plan.

ES Credit 1 continued

Outdoor Grounds & Building Exterior Management

Resources

Pennsylvania Green Building Operations and Maintenance Manual;
www.dgs.state.pa.us/dgs/lib/dgs/green_bldg/greenbuildingbook.pdf.

Healthy Hospitals, Controlling Pest without Harmful Pesticides, 2003.

Hospitals for a Healthy Environment: www.h2e-online.org.

Beyond Pesticides: www.beyondpesticides.org.

Health Care Without Harm: www.noharm.org.

Insect Management for the Interiorscape Environment: <http://ipm.ncsu.edu/InteriorScapes/insect.html>.

US EPA, Integrated Pest Management for Schools: A How-to Manual, EPA 909-B-97-001, March, 1997.
www.epa.gov/pesticides/ipm/.

2 points

ES Credit 2

Indoor Integrated Pest Management

Intent

Reduce human exposure to physical and chemical hazards and odors associated with pest management products and practices by employing custodial operations that use safe methods and low-toxicity or non-toxic pest management products.

Health Issues

The health of building occupants is directly impacted by the use of chemical pesticides, termiticides, and rodenticides. In health care environments, pesticides may impact the indoor air quality both in their exterior applications proximate to air intakes, and in the use of chemical pesticides for indoor pest control. Integrated Pest Management (IPM) is a cost effective coordinated approach to pest control that seeks to prevent unacceptable levels of pests with the least possible hazard to building occupants, workers, and the environment. The focus of IPM is on non-chemical prevention of pest problems. Preferential management methods include cultural, mechanical, physical and biological controls, with least hazardous pesticides used only as a last resort.

Credit Goals

- Develop and implement an Integrated Pest Management Program for managing pest control in the building interior, including, at a minimum:
 - Methods of identifying pests and monitoring levels of infestation.
 - Stated action thresholds, or the level of infestation that can be tolerated.
 - Listing of preventive or corrective actions to be employed (such as sanitation, structural repairs, and ongoing maintenance), traps, and the judicious use of least toxic chemical pesticides.
- The plan shall promote safer alternatives to chemical pesticides while preventing economic and health damage caused by pests. The plan shall implement the use of IPM techniques to reduce the need for reliance on chemical pesticides. When pesticides may be necessary, the plan shall ensure that clear and accurate notification concerning the use of pesticides be made available so that measures may be taken to prevent and address pest problems effectively without endangering occupants, janitorial workers or visitors.
- The plan shall include a communication strategy to provide notification of the IPM system. This shall include information and notice to tenants or directly to occupants in an owner-occupied building. The notice shall include a description of the Integrated Pest Management system and a list of all pesticides, including any least toxic pesticide that may be used in the building as part of the Integrated Pest Management system; the name, address, and telephone number of the contact person of the building; and a statement that the contact person maintains the product label and material safety data sheet (MSDS) of each pesticide used in the building, that the label or MSDS is available for review upon request, and that the contact person is available for information and comment.
- The communications strategy shall address "Universal Notification," which requires notification not less than 72 hours before a pesticide, other than a least toxic pesticide, is applied in a building.

ES Credit 2 continued

Indoor Integrated Pest Management

- The plan shall address under what circumstances an emergency application of pesticides in a building or on surrounding grounds being maintained by the building can be conducted without complying with the earlier provisions. In addition, address notification strategies to ensure that occupants and janitorial workers are notified within 24 hours of the pesticide application.

Documentation

- cj Compile the Integrated Pest Management (IPM) Program developed by the facility.
- cj Verify that the Integrated Pest Management Program has been followed during the performance period.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Basic IPM strategies include maintenance and repair of the basic structural integrity of the building, including:

- Design and construct buildings to be as pest resistant as possible and maintain them well.
- Eliminate cracks and holes to keep pests out. Lightly dust gaps between walls and other voids with boric acid before closing them up.
- Use physical barriers to block pest entry and movement (such as door sweeps, screens at chimneys and air intakes, doors and windows).

Implement and enforce sanitation procedures to limit pests' access to food and drink. Address leaky faucets, condensation on pipes, and all edibles. Store refuse in tightly sealed containers, and in controlled areas of the building.

Use least toxic pesticides judiciously only as last resort. "Least toxic" are those that have low or no acute or chronic toxicity to humans, affect a narrow range of species, and are formulated for application in a manner that limits or eliminates exposure of humans and other non-target organisms.

Examples include products formulated as baits (e.g., boric acid), pastes or gels which do not volatilize in the air and which utilize very small amounts of the active ingredient pesticide, insecticidal and herbicidal soaps; and microbial pesticides (e.g., *bacillus thuringiensis* (*B.t.*) formulated from fungi, bacteria, or viruses that are only toxic to specific pest species but harmless to humans, and natural substances such as corn gluten meal., See EPA web site for list of least-toxic pesticides (www.epa.gov/pesticides/ipm/).

ES Credit 2 continued

Indoor Integrated Pest Management

Resources:

On Preparing IPM programs and Examples:

Healthy Hospitals, Controlling Pests without Harmful Pesticides, 2003. Beyond Pesticides and Health Care Without Harm, www.noharm.org.

US EPA, Integrated Pest Management for Schools: A How-to Manual, EPA 909-B-97-001, March, 1997. www.epa.gov/pesticides/ipm/.

For Chemical Information:

EXTOXNET Pesticide Information Profiles (PIP); <http://ace.ace.orst.edu/info/extoxnet>.

For information on Alternatives to Pesticides:

Beyond Pesticides, 701 E Street, SE, Suite 200 Washington, DC 20003, www.beyondpesticides.org.

The Bio-Integral Resource Center (BIRC), PO Box 7414, Berkeley, CA 94704, www.birc.org.

Washington Toxics Coalition, 4516 University Way, Seattle, WA 98105, www.watoxics.org.

Northwest Coalition for Alternatives to Pesticides, PO Box 1393 Eugene, OR 97440-1393, www.pesticide.org.

1 point

ES Credit 3

Environmentally Preferable Cleaning Policy

Intent

Limit exposure of building occupants and maintenance personnel to potentially hazardous chemical, biological and particulate contaminants.

Health Issues

Sustainable maintenance practices are an essential part of sustainable building. Traditional cleaning products present a variety of human health and ecological concerns. They may contribute to poor indoor air quality and contain chemicals that cause cancer, reproductive disorders, respiratory ailments (including occupational asthma), eye and skin irritation, central nervous system impairment, and other human health effects. In addition, some of these products contain persistent bioaccumulative and toxic chemicals (PBTs), are classified as hazardous waste, and/or otherwise contribute to environmental pollution during their manufacture, transport, use, and/or disposal.

In health care settings, continuous 24/7 building occupancy leads to the requirement for cleaning while the building is occupied. Non-toxic and least-toxic sustainable maintenance products exist for virtually every health care facility need. Using “green” cleaners can reduce maintenance costs, protect the environment, safeguard the health of building occupants, increase employee productivity and improve indoor air quality.

Credit Goals

- Develop and maintain an environmentally preferable cleaning policy for all surfaces, including floors, walls, furniture and medical equipment addressing:
 - Sustainable floor care systems that employ "metal free" floor finish that extends the period between stripping and recoating for at least 12 months, with a preference for phthalate-free products.
 - Levels of required disinfection for all surfaces.
 - Sustainable cleaning systems.
 - Use of sustainable cleaning products.
 - Use of chemical concentrates and appropriate dilution systems.
 - Proper training of maintenance personnel in the hazards, use, maintenance and disposal of cleaning chemicals, dispensing equipment and packaging.
 - Use of hand soaps that do not contain antimicrobial agents (other than as a preservative system), except where required by health codes and other regulations (i.e., food service and health care requirements).
 - Use of cleaning equipment that does not negatively impact IAQ.

ES Credit 3 continued

Environmentally Preferable Cleaning Policy

- Standards should include:
 - General cleaning and building maintenance products that comply with the minimum criteria established by Green Seal's Industrial and Institutional Cleaners Standard GS-37 for those categories covered or California Code of Regulations low-VOC cleaning products for those categories not covered.
 - Levels of required disinfection for all surfaces. The policy should differentiate those areas where cleaning of surfaces requires intermediary grade disinfectants (such as surfaces with routine exposure to blood), areas and surfaces where lower grade disinfectants/sanitizers are appropriate, and areas where cleaners (non-FIFRA – Federal Insecticide, Fungicide & Rodenticide Act) products are sufficient.
 - Training of cleaning personnel, quality assurance, infection control and other personnel involved in maintenance, housekeeping, and purchasing, in both chemical safety as well as the above specific policies and procedures with regard to floor care systems and disinfection of surfaces. Training shall include procedures to reduce impacts from cleaning products on the health of facility occupants and the environment.
 - Minimize added fragrances in cleaning products.

Documentation

- q Compile the environmentally preferable cleaning policy adopted by your organization.
- q Verify that this policy has been followed over the performance period.
- q Confirm the chemical and cleaner dispensing and dilution equipment used.
- q Identify the date and activities associated with floor maintenance.
- q Document training of facility maintenance, superintendent and cleaning staff.

Reference Standards

Green Seal Industrial and Institutional Cleaners Standard GS-37,
<http://www.greenseal.org/standards/industrialcleaners.htm>.

Green Seal Certified Cleaners, <http://www.greenseal.org/certproducts.htm>.

California Air Resources Board, www.calregs.com.

Potential Technologies & Strategies

Have in place over the performance period an environmentally preferable cleaning policy that addresses sustainable cleaning and hard flooring coating systems products, utilization of concentrated cleaning products and associated housekeeping protocols. Floor coating products that are free of metals (e.g., zinc) and phthalates are preferred.

3 points

ES Credit 4

Sustainable Cleaning Products & Materials

Intent

Limit exposure of building occupants and maintenance personnel to potentially hazardous chemical, biological and particulate contaminants.

Health Issues

Sustainable maintenance practices are an essential part of sustainable building. Traditional cleaning products present a variety of human health and ecological concerns. They may contribute to poor indoor air quality and contain chemicals that cause cancer, reproductive disorders, respiratory ailments (including occupational asthma), eye and skin irritation, central nervous system impairment, and other human health effects. In addition, some of these products contain persistent bioaccumulative and toxic chemicals (PBTs), are classified as hazardous waste, and/or otherwise contribute to environmental pollution during their manufacture, transport, use, and/or disposal.

In health care settings, continuous 24/7 building occupancy leads to the requirement for cleaning while the building is occupied. Non-toxic and least-toxic sustainable maintenance products exist for virtually every health care facility need. Using “green” cleaners can reduce maintenance costs, protect the environment, safeguard the health of building occupants, increase employee productivity and improve indoor air quality.

Credit Goals

- Adopt and implement sustainable purchasing policy for cleaning products and materials. Cleaning product and material purchases include building purchases for use by in-house staff or used by outsourced service providers. Calculate the percentage of the total sustainable material and product purchases on a cost basis that meet the following sustainability criteria:
 - Cleaning products that meet the Green Seal GS-37 standard if applicable, OR if GS-37 is not applicable, use products that comply with the California Code of Regulations' maximum allowable VOC levels.
 - Minimize added fragrances in cleaning products.

Credit 4.1	Purchase sustainable for 30% of annual purchases (1 point)
Credit 4.2	Purchase sustainable for 60% (1 point in addition to 4.1)
Credit 4.3	Purchase sustainable for 90% (1 point in addition to 4.2)

Documentation

- q Compile the organizational policy that specifies use of sustainability criteria for purchases of covered materials for use in the building or on the site.
- q Document all covered materials purchases that meet the specified sustainability criteria and the cost of these purchases over the performance period.
- q Calculate the fraction of covered materials purchased that meet the specified sustainability criteria (on a cost basis).

ES Credit 4 continued

Sustainable Cleaning Products & Materials

Reference Standards

Green Seal Industrial and Institutional Cleaners Standard GS-37, <http://www.greenseal.org/standards/industrialcleaners.htm>.

Green Seal Certified Cleaners, <http://www.greenseal.org/certproducts.htm>.

California Air Resources Board, www.calregs.com.

Occupational Asthmagen List: www.remcomp.com/asmanet/asmapro/asmawork.htm.

ASTM E1971-98, Standard Guide for Stewardship for the Cleaning of Commercial and Institutional Buildings.

Potential Technologies & Strategies

Operations and maintenance practices ensure that the building functions at its highest levels of energy efficiency and indoor air quality performance. Scheduled maintenance and cleaning practices impact energy savings and occupant health and comfort. Effective operations and maintenance strategies include:

- Phase out the use of flooring materials that require ongoing stripping and waxing procedures to achieve their performance. Seek out the least toxic stripping and waxing protocols available for each flooring installation. Equip floor buffers and burnishers with an enclosed system for capturing chemical vapors and particulate matter generated during the cleaning process.
- Use high-efficiency vacuum bags or high efficiency particulate air (HEPA) filters in compliance with cited standards, as carpets tend to be “sinks” for dirt and dust. Maintain carpets through hot water extraction methods; avoid overwetting. Water-damaged carpets can harbor mold, mildew or bacteria. For HEPA Vacuum Systems reference: ASTM F1977-99 Full Vacuum Fractional Efficiency. For HEPA filters: ASTM 1471-93(2001) Air Cleaning Performance of a High Efficiency Particulate Air-Filter System.
- Establish cleaning and maintenance protocols in the context of an overall Indoor Air Quality Plan. Coordinate housekeeping and custodial operations with building ventilation schedules to ensure that adequate ventilation is provided, both during and after cleaning activities.
- Replace aerosolized application methods in favor of pour and wipe to decrease airborne concentrations of chemicals. Use portion control devices such as mechanical dispensers, which help insure the safe mixing of cleaning solutions, save packaging, and reduce chemical consumption.
- Refer to applicable state and local ordinances and guidelines; many states are enacting standards for building maintenance products.
- Specify textiles (upholstery) that can be cleansed with water-based, not solvent-based cleaners.

ES Credit 4 continued

Sustainable Cleaning Products & Materials

All general cleaning products should be environmentally preferable and, at a minimum, meet the criteria established by Green Seal's Industrial and Institutional Cleaners Standard GS-37. To meet Green Seal standards a product must not be acutely toxic to humans; contain no carcinogens or reproductive toxicants; not be corrosive to eyes or skin; not be a skin sensitizer; not be combustible; contain no or low VOCs (volatile organic compounds); not be toxic to aquatic life; be biodegradable; contain low or no phosphorus; be a concentrate; have recyclable or reusable packaging; contain no alkylphenol ethoxylates, dibutyl phthalate, heavy metals (arsenic, lead, cadmium, cobalt, chromium, mercury, nickel, selenium), or ozone-depleting compounds; and come with proper labeling and training on product use.

Prohibit products that are manufactured with mutagens and teratogens; aerosols; asthma-causing agents (asthmagens), respiratory irritants, and chemicals that aggravate existing respiratory conditions; neurotoxins; endocrine modifiers; benzene-based solvents, butoxyethanol, chlorinated organic solvents, and paradichlorobenzene; very acidic or alkaline products; anti-microbial agents in hand soaps for patients and visitors; persistent, bioaccumulative and toxic chemicals (PBTs); and products requiring disposal as hazardous waste. Use combination cleaner/disinfectants; use fragrances and dyes judiciously, and only as necessary or where appropriate.

Resources

INFORM, Inc. Cleaning for Health: Products and Practices for a Cleaner Indoor Environment, August, 2002, <http://www.informinc.org/cleanforhealth.php>.

US EPA, Environmentally Preferable Products Program, <http://www.epa.gov/oppt/epp/documents/docback.htm>.

Pennsylvania Department of General Services, www.dgs.state.pa.us/dgs/lib/dgs/green_bldg/greenbuildingbook.pdf.

Environmental Defense, Scorecard, www.scorecard.org/chemical-profiles/index.tcl.

1 point

ES Credit 5

Environmentally Preferable Janitorial Equipment

Intent

Limit exposure of building occupants and maintenance personnel to potentially hazardous chemical, biological and particulate contaminants.

Health Issues

Sustainable maintenance practices are an essential part of sustainable building. Traditional cleaning products present a variety of human health and ecological concerns. They may contribute to poor indoor air quality and contain chemicals that cause cancer, reproductive disorders, respiratory ailments (including occupational asthma), eye and skin irritation, central nervous system impairment, and other human health effects. In addition, some of these products contain persistent bioaccumulative and toxic chemicals (PBTs), are classified as hazardous waste, and/or otherwise contribute to environmental pollution during their manufacture, transport, use, and/or disposal.

In health care settings, continuous 24/7 building occupancy leads to the requirement for cleaning while the building is occupied. Non-toxic and least-toxic sustainable maintenance products exist for virtually every health care facility need. Using “green” cleaners can reduce maintenance costs, protect the environment, safeguard the health of building occupants, increase employee productivity and improve indoor air quality.

Credit Goals

- Develop, implement and maintain a policy for the use of janitorial equipment that maximizes effective reduction of building contaminants while minimizing environmental and health burdens.
- Required elements in the Cleaning Equipment Policy include:
 - Vacuum cleaners meet the requirements of the Carpet & Rug Institute Green Label Program and are capable of capturing 96% of particulates 0.3 microns in size and operate with a sound level less than 70dBA.
 - Hot water extraction equipment for deep cleaning carpets is capable of removing sufficient moisture such that carpets can dry in less than 24 hours.
 - Powered maintenance equipment including floor buffers, burnishers and automatic scrubbers is equipped with vacuums, guards and/or other devices for capturing fine particulates, and shall operate with a sound level less than 70dBA.
 - Propane-powered floor equipment has high-efficiency, low-emissions engines.
 - Automated scrubbing machines are equipped with variable-speed feed pumps to optimize the use of cleaning fluids.
 - Battery-powered equipment is equipped with environmentally preferable gel batteries.
 - Where appropriate, active micro fiber technology is used to reduce cleaning chemical consumption and prolong life of disposable scrubbing pads.

ES Credit 5 continued

Environmentally Preferable Janitorial Equipment

- Powered equipment is ergonomically designed to minimize vibration, noise and user fatigue.
- Equipment has rubber bumpers to reduce potential damage to building surfaces.
- A logbook will be kept for all powered housekeeping equipment to document the date of equipment purchase and all repair and maintenance activities and include vendor cut sheets for each type of equipment in use.

Documentation

- q Provide a copy of the environmentally preferable janitorial equipment policy adopted by your organization.
- q Provide a record of the janitorial equipment used in the building and a log of the maintenance of each piece of equipment over the performance period. Include vendor specifications for each type of equipment in use.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Develop, implement and maintain a policy for the use of janitorial equipment that maximizes effective reduction of building contaminants while minimizing environmental and health burdens. Evaluate the janitorial equipment currently being used and make a plan for upgrading to janitorial equipment consistent with this policy.

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Environmentally Preferable Purchasing

1 point

EP Credit 1.1

Food: **Organic or Sustainable**

Intent

Support sustainable food production and improved environmental health through purchase of organic, drug free and locally produced food products.

Health Issues

Conventional food production is pesticide intensive resulting in occupational hazards and the potential for groundwater contamination. Rainfall frequently contains a variety of agricultural pesticides: a 1995 U.S. Geologic Survey of urban and agricultural sites found detectable levels of multiple pesticides in every sample. Foods may be contaminated with pesticide residues above acceptable food safety limits. Imported food may be contaminated with undue pesticide residues including pesticides banned domestically (such as DDT).

Credit Goals

- Obtain at least 25% of combined food and beverage purchases from any combination of the following sources:
 - USDA certified organic
 - Food Alliance Certified
 - Rainforest Alliance Certified
 - Protected Harvest
 - Fair Trade Certified
 AND/OR
 - Local farms within a 100 mile radius of the facility.

Documentation

- q Verify through purchasing records that at least 25% of combined food and beverage purchases, based on total dollars expended, meet the requirements of:
- Organic certification through USDA, the State of California or the certifying entity of another governmental body or through any of the following third party certification systems: Food Alliance certified, Rain Forest Alliance certified, Protected Harvest, or Fair Trade certified.
- AND/OR
- Local farm sourcing (within 100 mile radius of facility).

Reference Standards

The United States Department of Agriculture oversees the National Organic Standards Program <http://www.ams.usda.gov/nop/Consumers/Consumerhome.html>.

EP Credit 1.1 continued

Food: Organic or Sustainable

Food Alliance is a third party certifier of sustainable agricultural practices and products. Before certification is granted, farms and ranches must meet a strict set of environmental and social criteria covering soil and water conservation, wildlife habitat, pesticide reduction and/or elimination, safe and fair labor conditions and animal welfare.

<http://www.foodalliance.org/certification/FACertification.htm>

Fair trade is a dynamic, alternate economic model that strives to protect the market over the long term including the self reliance of small-scale farmers and protecting vital eco-systems throughout the developing world thereby strengthening rural communities.

<http://www.transfairusa.org/content/about/overview.php>

Protected Harvest is an Integrated Pest Management program. The pest management guidelines developed by the collaboration include guidelines in the following areas: field scouting, information management, pest management decisions, field management decisions, weed management, insect management, disease management, soil and water quality, and storage management. Pesticide toxicity is also assessed quantitatively and is based on specific pesticide use. Certain pesticides are explicitly prohibited from use. Protected Harvest has an explicit policy prohibiting the use of genetic engineering.

<http://www.protectedharvest.org/>

Under the auspices of the Sustainable Agriculture Network (SAN), the Rainforest Alliance and partner organizations work with farmers to bring their operations up to standards for protecting wildlife, wild lands, workers' rights and local communities.

<http://www.rainforest-alliance.org/programs/agriculture/certification/index.html>

Potential Technologies & Strategies

Many smaller local farm sources will not have the resources or will not have completed the transition to obtain state or USDA organic certification but subscribe to sustainable agriculture practices and deserve support. Sustainable agriculture is plant and food animal cultivation that is healthful and humane, economically viable, environmentally sound, and socially just. There is no single definition for sustainable agriculture, but such a system has certain characteristics, including:

- Conservation and preservation: The use of land and other natural resources does not deplete their existence and therefore makes those resources available to future generations. Chemicals in agriculture are not conducive to sustainability, and therefore should be used minimally and only when necessary. Conservation in agriculture includes soil conservation, water conservation and protection, and energy conservation during the production process.
- Animal welfare: Sustainably raised animals are treated humanely and with respect, and are well cared for. They are permitted to carry out their natural behaviors, such as grazing, rooting or pecking, and are provided with a natural diet appropriate for their species.
- Biodiversity: Rotation of a variety of plant and animal types can enrich the soils nutrients, prevent disease, and minimize pest outbreaks, whereas continued support of a single species depletes those resources used by that species alone. Renewal of the ecosystem is an integral part of sustainability.

EP Credit 1.1 continued

Food: **Organic or Sustainable**

Economic viability: In a sustainable agricultural system, farmers earn fair prices for their products that are appropriate to their reasonable costs. A sustainable system does not depend on subsidies, because workers are treated fairly, and paid wages and benefits that allow them to continue their work.

Strive to support local farmers first. Participate in local Community Supported Agriculture (CSA) farming programs or other regional food distribution initiatives, if applicable to your region. Encourage local food suppliers and vendors to increase availability of organically grown food products.

Resources

The Organic Trade Association (OTA) is the membership-based business association for the organic industry in North America. OTA's mission is to encourage global sustainability through promoting and protecting the growth of diverse organic trade, <http://www.ota.com/index.html>.

The Eat Well Guide is designed to help consumers locate sustainably raised meats, eggs, and dairy in their local area, or by online order if there are few local options, <http://www.eatwellguide.org/index.cfm>.

National Rural Catholic Conference on the Ethics of Eating, <http://www.ncrlc.com/>.

1 point

EP Credit 1.2

Food: Antibiotics

Intent

Support sustainable food production and improved environmental health through purchase of organic, drug free and locally produced food products.

Health Issues

Widespread use of antibiotics in meat production is raising concerns of antibiotic pass unchanged into animal waste. Meat can and does become contaminated during slaughter and meat processing. Often spread onto fields or sold as fertilizer, manure can contaminate surface or groundwater with antibiotic-resistant bacteria. The air from livestock barns using antibiotic feeds can contain several times the concentration of antibiotic resistant bacteria as do other livestock facilities. Widespread use of pesticides is threatening ecological health. Increased demand for organic foods and adoption of sustainable agricultural practices lessens these burdens.

Credit Goals

- Establish a meat procurement purchasing policy that includes the following requirements:
 - Regularly and consistently inform suppliers of meat, poultry, dairy, and seafood products of the preference for purchasing products that have been produced without non-therapeutic use of antibiotics, particularly those that belong to classes of compounds approved for use in human medicine. Procure a minimum of 50% of the total volume of such purchasing in compliance with this requirement.
 - Chicken: Unless these products are not available to the institution because of local supply constraints, chicken will only be purchased if it has been produced without the non-therapeutic use of antibiotics that belong to classes of compounds approved for use in human medicine; and without any use of fluoroquinolone antibiotics.
 - Poultry other than chicken will receive a purchase preference if it has been produced without the non-therapeutic use of antibiotics, particularly those that belong to classes of compounds approved for use in human medicine.

Documentation

- q Verify through purchasing records that at least 50% of meat, poultry, dairy and seafood purchases, based on total dollars expended, meet the antibiotics requirements.

Reference Standards

There are no reference standards for this credit..

EP Credit 1.2 continued

Food: Antibiotics

Potential Technologies & Strategies

Enlist support from your medical and infection-control staff. Medical staff and infection control professionals appreciate the threat of drug resistant disease. However, many are unaware that antibiotic overuse in agriculture can contribute to the development of resistance. Discuss amending your facility's antibiotic use guidance policy to include guidance on food service procurement as it relates to antibiotic use in agriculture.

Work with the facility's Group Purchasing Organization (GPO) – Participate in facility GPO's selection process for food vendors. Inform contacts of interest in purchasing such products through them. Inform them that poultry is available without a price premium. If paying a price premium for other meats is possible, communicate that to the facility's GPO.

Resources

Interagency Task Force on Antimicrobial Resistance, A Public Health Action Plan to Combat Antimicrobial Resistance. p. 9, www.cdc.gov/drugresistance/actionplan/aractionplan.pdf,

Environmental Defense, 2001. When Wonder Drugs Don't Work: How Antibiotic Resistance Threatens Children, Seniors, and the Medically Vulnerable. Washington, DC: Environmental Defense, http://www.environmentaldefense.org/documents/162_abrreport.pdf.

Centers for Disease Control (CDC). Background on Antibiotic Resistance. Atlanta, GA, www.cdc.gov/drugresistance/community.

Infectious Diseases Society of America (2003). Backgrounder: Bad Bugs, No Drugs - Defining the Antimicrobial Availability Problem," <http://www.idsociety.org/Template.cfm?Section=Home&CONTENTID=7455&TEMPLATE=/ContentManagement/ContentDisplay.cfm>.

Joint WHO/FAO/OIE Expert Workshop on Non-human Antimicrobial Usage and Antimicrobial Resistance, Geneva, 1 – 5 December 2003, Executive Summary, <http://www.who.int/foodsafety/micro/meetings/nov2003/en/>.

1 point

EP Credit 1.3

Food: Local Production/ Food Security

Intent

Support sustainable food production and improved environmental health through purchase of organic, drug free and locally produced food products.

Health Issues

Local food production reduces the fuel consumption and accompanying emissions associated with long distance transport. Large centralized farms tend to increase unhealthy practices such as large feedlots and more intensive large scale mono-cropping that increase air and runoff water pollution. Conventional food production is pesticide intensive resulting in occupational hazards and the potential for groundwater contamination. Rainfall frequently contains a variety of agricultural pesticides: a 1995 U.S. Geologic Survey of urban and agricultural sites found detectable levels of multiple pesticides in every sample. Foods may be contaminated with pesticide residues above acceptable food safety limits. Imported food may be contaminated with undue pesticide residues including pesticides banned domestically (such as DDT).

Credit Goals

- **Farmers Markets**

- Host and promote on-site farmers market during growing season(s)

OR

- Support and promote local farmers market during growing season(s).

OR

- **Farmers-Consumer Links**

- Provide access and support of direct farmer-to-consumer link, such as Community Supported Agriculture and/or food box program to patients, with a priority on low income population.

OR

- **Farms and Gardens**

- Support on-site food producing garden and/or urban food producing garden programs that are accessible to the public.

Documentation

- q Document relationship with community-based farming and/or marketing initiatives.

EP Credit 1.3 continued

Food: Local Production/ Food Security

Potential Technologies & Strategies

Fresh, nutritious food is available at farmers markets across the United States. Farmers' food box programs, where farmers drop off a weekly food supply, allow access to nutritious food. Potential drop-off sites include child care centers, and/or local schools or other sites where families regularly visit.

In many urban areas, vacant lots are converted into urban gardens. Studies have shown that urban gardens have a measurable impact on nutrition and that access to community gardens is an important strategy for improving vegetable consumption.

Resources

Community Food Security Coalition
<http://www.foodsecurity.org/>.

Ripe for Change: Rethinking California's Food Economy addresses the root causes of breakdown in the food economy and points to solutions and case studies of how an alternative vision can work
<http://www.isec.org.uk/ripeforchange.html>.

The primary focus of the U.S. Department of Agriculture's nutrition assistance programs is providing food security
<http://www.fns.usda.gov/fsec/>.

1 point

EP Credit 2**Janitorial Paper & Other Disposable Products****Intent**

Reduce use of virgin paper resources in janitorial paper and other disposable product applications.

Health Issues

Each year, US commercial and institutional users consume 4.5 billion pounds of janitorial paper and 35 billion plastic trash liners. Paper products with high recycled content reduce sulfur and greenhouse gas emissions during manufacture, conserve virgin forest resources and contribute to healthier forest ecosystems.

Credit Goals

- Develop and maintain an environmentally preferable janitorial paper and other disposable product policy, addressing the following:
 - Use disposable janitorial paper products and trash bags that meet the most current U.S. EPA's Comprehensive Procurement Guidelines (CPG) for recycled content. The following recycled requirements were accurate at the time of printing:

Toilet tissue	20% minimum Post Consumer content
Paper hand towels	40% minimum Post Consumer content
Industrial wipes	40% minimum Post Consumer content
Facial tissues	10% minimum Post Consumer content
Plastic trash liners	10% minimum Post Consumer content

- Give preference to paper products that are manufactured Process Chlorine-Free.
- Use large rolls wherever possible, and hands-free dispensers that limit paper portions. Do not use C-fold or multi-fold paper towel systems.

Documentation

- q Maintain a copy of the environmentally preferable disposable product purchasing policy.
- q Document that the policy has been followed in purchasing and procurement of supplies.

Reference Standards

EPA Comprehensive Procurement Guidelines, www.epa.gov/cpg/products.htm.

Potential Technologies & Strategies

Purchase janitorial products with high post-consumer recycled content. Wherever possible, install roll type dispensers to limit quantities of paper products used.

1 point

EP Credit 3**Electronics Purchasing & Take Back****Intent**

Require take back and management services for end-of-life electronic products to safely manage hazardous compounds.

Health Issues

Computers and other electronic wastes contain highly hazardous compounds and/or metals. Due to the increased sales and shorter life spans of IT equipment, electronic waste has become one of the world's fastest growing waste streams. The average electronic product contains hazardous materials including: chlorinated plastics in cable wiring, brominated flame retardants in circuit boards, heavy metals like lead and cadmium in Cathode Ray Tube (CRT) monitors, mercury in Liquid Crystal Display (LCD) or flat panel monitors.

IT equipment contains chemicals that are known or probable teratogens, persistent bioaccumulative substances, carcinogens, reproductive toxicants, endocrine disruptors, and mutagens. Less than ten percent of discarded computers are currently recycled, with the remainder stockpiled or improperly disposed of in landfills or incinerators or illegally exported to developing countries for disassembly under unsafe conditions. As a result, the toxic substances can be released into air, ground and water directly exposing recycling workers and threatening the global public and ecological health.

Credit Goals

- Establish an IT Assets Management Team with staff from IT, Environmental Services/ Recycling, Procurement, Administration and Risk Officers.
- Develop an IT-Environmental management plan. The IT-Environmental management plan should include strategies around Procurement, Reduction, Responsible Reuse, and Responsible Recycling.
- Each of these strategies should be in compliance with federal and state solid waste and hazardous waste disposal regulations, including Universal Waste Rules, and include:
 - Manufacturers' written commitments of equipment take-back at end of product life.
 - Verification that only those recyclers that have signed the Recycler's Pledge of Environmental Stewardship, and verified that they do not export hazardous waste, shall be contracted with.
 - A HIPAA (Health Insurance Portability and Accountability Act) compliance plan for electronic products.

EP Credit 3 continued

Electronics Purchasing & Take Back

Documentation

- Document the Electronics Purchasing and Take Back requirements, and periodically review for continued compliance with the requirements.

Potential Technologies & Strategies

Seek product take-back for electronic assets at the end of their useful life at the time of signing new contracts with equipment manufacturers. Contract only with recyclers that have signed the Recycler's Pledge of Environmental Stewardship, and that provide adequate documentation proving they do not landfill, incinerate or export e-waste. Contract for new equipment by seeking manufacturers that have demonstrated product improvement on key environmental and health attributes related to both the product and the manufacturing facility and for products that have upgradeability options enabling the equipment can have longer use value without being replaced.

Reference Standards

Health Care Without Harm's Procurement Guidelines:

<http://www.noharm.org/details.cfm?ID=878&type=document>.

For vendors that have signed the Recycler's Pledge, visit: <http://www.ban.org/pledge/Locations.html>.

For more information on end-of-life choices for electronic equipment, refer to Hospitals for a Healthy Environment's document: *Healthier Choices for Electronic Equipment: From Procurement to End-of-Life*, <http://www.h2e-online.org/tools/uniwast.htm>.

For information on environmentally responsible recyclers: <http://www.ban.org/pledge1.html>.

1 point

EP Credit 4.1Toxic Reduction: **Mercury****Intent**

Eliminate stand-alone mercury-containing medical devices and eliminate mercury discharge through product substitution and capture.

Health Issues

In 1998, a Memorandum of Understanding between the American Hospital Association and the US EPA set new goals for hospital pollution prevention. One of the top priorities was the virtual elimination of mercury and mercury-containing devices from the hospital waste stream by the year 2005. Mercury is a potent neurotoxin. The most sensitive health effect of mercury is an adverse impact on the neurological development of fetuses, infants and children. Low-level prenatal exposure can result in language, memory and attention deficits in children who were exposed in utero. Hospitals have substantially reduced the purchase of mercury-containing chemicals and medical devices and found substitutes for many pharmaceuticals. To achieve virtual elimination of mercury from the waste stream, however, requires the phasing out and recycling of mercury-containing building products, such as thermostats, switches, batteries, and lamps, for mercury recovery.

Requirements

- Develop a mercury-free policy.
- Obtain low mercury fluorescent tubes and compact fluorescent lamps, and low mercury high intensity discharge lamps such that average mercury content in fluorescent tubes and compact fluorescent lamps does not exceed 5 mg of mercury, and that high-intensity discharge lamps have the lowest available mercury content, providing that all other performance specifications are met.
- Eliminate specification and use of barometers, medical devices, and other stand-alone mercury containing medical equipment.
- Obtain mercury-free MRI equipment, wheel chairs, automated beds and other medical and laboratory equipment.
- Collection and disposal of any mercury-containing devices shall be designated for recycling and preclude overseas donation/disposal.
- Develop a mercury spill protocol, and hold recaptured mercury for safe disposal.

Documentation

- q Document that the facility is free of mercury-containing devices (excepting lamps and any devices mandated by Federal law), and that any dental facilities have installed amalgam separators that meet or exceed the standard ISO-11143.
- q Prepare and adopt an organizational policy specifying that all future purchases of mercury-containing lamps will be made in such a way that the average mercury content of the lamps does not exceed 5 mg of mercury.
- q Document all acquisitions during the performance period of mercury-containing light bulbs for use in the building and grounds.

EP Credit 4.1 continued

Toxic Reduction: **Mercury**

- q Include manufacturer Material Safety Data Sheets (MSDS) for each type of mercury-containing lamp purchased showing mercury content in milligrams.
- q Compile a copy of the Waste Management Plan highlighting the types of mercury- containing devices in use that are handled by the recycling program and disposal methods for captured mercury. Include dental wastes, including scrap amalgam, chairside traps, and separator wastes, as applicable.
- q Maintain purchasing records and technical data on lamps verifying that the average mercury concentration for all fluorescent tubes and compact fluorescent lamps does not exceed than 5 mg.
- q Verify that high-intensity discharge lamps are purchased with the lowest mercury content, providing that all other performance specifications are met.

Reference Standards

The American Hospital Association (AHA) and the United States Environmental Protection Agency (EPA) signed a Memorandum of Understanding identifying goals to reduce the impact of health care facilities on the environment. A primary goal included the virtual elimination of mercury waste from the health care waste stream by the year 2005.

<http://www.h2e-online.org/about/mou.htm>.

A variety of state laws prohibiting some or all uses of mercury-containing medical devices and/or mercury switches have been enacted into law. These include but are not limited to:

- *Maine State law (LD 1159)* that prohibits the sale of mercury in switches, measuring devices (including sphygmomanometers), instruments and thermostats.
- *Washington State law (House Bill 1002)* that requires the labeling of fluorescent lamps that contain mercury. Prohibits the sale of mercury-containing items in products such as thermometers and thermostats. Sphygmomanometers may not be sold with the exception of a hospital or health care facility with a mercury reduction plan in place.
- *Michigan State law (House Bill 4599)* that bans the sale of mercury thermometers.
- *Connecticut State law (House Bill 5539)* that bans the sale and distribution of mercury fever thermometers and places restrictions on the sale of other mercury-containing equipment.
- *Massachusetts State law (House Bill 3772)* that bans the sale of mercury fever thermometers.
- *California State law (SB 633)* that restricts the use and distribution of mercury fever thermometers and other uses.
- *Oregon State law (HB 3007)* that phases out mercury thermostats and prohibits the sale of fever thermometers and other uses.

EP Credit 4.1 continuedToxic Reduction: **Mercury**

Potential Technologies & Strategies

Develop a facility-wide policy to guide removal and substitution of all mercury-containing medical equipment and devices. Conduct community-wide thermometer exchanges to encourage the public to return mercury-containing devices for proper recycling and disposal and replacement with digital alternatives.

Purchase low-mercury fluorescent lamps. Advances in lighting technology have greatly reduced the per bulb mercury concentrations. Low-mercury, high intensity discharge lamps are increasingly available. Consider long-life bulbs to reduce costs associated with relamping, recycling and purchase. Very low mercury fluorescent induction lighting, with instant on-off control, offering reduced energy usage and long life, should be considered.

Stay abreast of lighting technology advances noting the development of LED (low-emitting diode) technologies as substitutes for fluorescent.

1 point

EP Credit 4.2Toxic Reduction: **Di Ethyl Hexyl Phthalate (DEHP)****Intent**

Reduce and limit the exposure of patients, staff and visitors to DEHP from clinical products plasticized with DEHP.

Health Issues

DEHP is a reproductive toxicant. Under California's Proposition 65 law, DEHP-containing products are required to be labeled as containing a reproductive toxicant. In the United States, the Food and Drug Administration has issued an FDA Safety Assessment and a Public Health Notification urging health care providers to use alternatives to DEHP-containing devices for vulnerable patients. That advisory is consistent with findings issued in a report by the Center for the Evaluation of Risks to Human Reproduction of the National Toxicology Program. In Canada, an expert advisory panel to Health Canada has recommended that health care providers not use DEHP containing devices in the treatment of pregnant women, breastfeeding mothers, infants, males before puberty and patients undergoing cardiac bypass hemodialysis or heart transplant surgery. Phthalates such as DEHP have been measured in virtually all fresh water and marine environments, including Antarctic pack ice

Credit Goals

- DEHP is used extensively as a plasticizer in PVC-containing products. Facilities shall develop a DEHP phase-out plan. The plan shall require:
 - Audit and identify use areas of flexible PVC (or vinyl) plasticized with DEHP. Tubing, IV and blood bags are the primary end uses for disposable PVC medical products.
 - Develop a DEHP-free implementation plan, including timelines for phase-out for procedures identified by the FDA as high risk. According to the FDA these highest risk procedures are total parenteral nutrition in neonates (with lipids in PVC bag), enteral nutrition in neonates and adults, multiple procedures in sick neonates (high cumulative exposure), hemodialysis in peripubertal males or pregnant or lactating women, exchange transfusion in neonates, heart transplantation or coronary artery bypass graft surgery (aggregate dose), massive infusion of blood into trauma patient, extracorporeal membrane oxygenation (ECMO) in neonates, transfusion in adults undergoing ECMO.
 - The Purchasing Department and/or Group Purchasing Organization require manufacturers to label DEHP containing products.
 - A purchasing policy that gives preference to DEHP-free clinical and other products.

Documentation

- c** Prepare the DEHP Elimination Plan, Audit, and Phase-out Plan as required.

EP Credit 4.2 continued**Toxic Reduction: Di Ethyl Hexyl Phthalate (DEHP)**

Potential Technologies & Strategies

Perform a PVC/DEHP audit. Health Care Without Harm has developed a *PVC/DEHP Audit Tool* to aid in this process.

Require product acquisition teams/purchasing staff to assess products for DEHP content.

Reference Standards

United States Food and Drug Administration: <http://www.fda.gov/>.

Health Canada: http://www.hc-sc.gc.ca/hpfb-dgpsa/tpd-dpt/eap-dehp-final-report-2002-jan-11_e.html.

State of California's Proposition 65, the Safe Drinking Water and Toxic Enforcement Act of 1986, <http://www.oehha.ca.gov/prop65/law/P65law72003.html>.

Office of Environmental Health Hazard Assessment, <http://www.oehha.ca.gov/prop65.html>.

The National Toxicology Program (NTP) Center for the Evaluation of Risks to Human Reproduction (CERHR), <http://cerhr.niehs.nih.gov/>.

Case studies of facilities that have eliminated DEHP containing medical devices, <http://www.noharm.org/pvcDehp/reducingPVC#case>.

1 point

EP Credit 4.3Toxic Reduction: **Natural Rubber Latex****Intent**

Eliminate air contaminants and allergens emitted from medical supplies and devices and that release volatile organic compounds and other chemicals to ensure the health of building occupants and staff.

Health Issues

Natural rubber latex is a product manufactured from the milky fluid primarily derived from the rubber tree, *Hevea brasiliensis*. In 1997 the National Institute for Occupational Safety and Health (NIOSH) issued an alert indicating that exposure to natural rubber latex can lead to skin rashes; hives; flushing; itching; nasal, eye, or sinus symptoms; asthma; and (rarely) shock. They noted an increase in allergic reactions to latex, especially among health care workers. Children with spina bifida or urologic birth defects are particularly susceptible to latex allergies. Eliminating materials that emit chemicals recognized as irritants, allergens and/or asthma triggers minimizes building occupant exposure to conditions that may prompt and/or prolong an allergic or asthmatic condition.

Credit Goals

- Establish and implement a policy prohibiting the procurement and use of natural rubber latex surgical gloves, stethoscopes, blood pressure cuffs, intravenous tubing, syringes, tourniquets, endotracheal tubes, oral and nasal airways, balloons, and other products and materials containing natural rubber latex.
- Establish and implement a policy prohibiting the procurement and use of natural rubber latex in carpet backing.

Documentation

- q Document policy limiting the procurement and use of natural rubber latex products into buildings.
- q Document purchasing specifications excluding carpet backings with natural rubber latex.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Implement policies that provide for substitute products. Nitrile gloves are effective substitutes for natural latex products. Mylar balloons in lieu of latex balloons are increasingly commonplace.

1 point

EP Credit 5**Furniture & Medical Furnishings****Intent**

Reduce the environmental and health burdens associated with the manufacture, use and disposal of furniture and medical furnishings products.

Health Issues

The environmental and health issues surrounding materials used in the manufacture of furniture products parallel those outlined for building products in the Material and Resource credits. Significant health impacts are associated with the use of persistent, bioaccumulative and toxic chemicals (PBTs), chrome plated finishes, and wood harvesting for furniture products manufacture.

PBTs are toxic chemicals of particular health concern because they do not break down quickly in the environment, they become widely distributed geographically and they bio-magnify or concentrate in the tissue of living organisms as they move up the food chain. With a few exceptions, the major source of human exposures to PBTs in the general population occurs from the consumption of contaminated food in the ordinary diet. These toxic chemicals cause a range of adverse wildlife and human health effects, including cancer, and developmental impacts in the nervous, reproductive, and immune systems. Immature, developing organisms are the most sensitive to exposures to PBTs.

The furniture industry is a major market for wood products. Human and environmental health is inextricably linked with forest health. Sustainable forestry protects water quality by reducing water and soil runoff and pesticide and herbicide use. Specifying and procuring certified sustainably harvested wood increases acreage using sustainable management practices. These practices also protect aquatic life, including threatened and endangered species, and maintain viable diverse plant life increasing air filtration and carbon dioxide sequestration. The balancing of carbon dioxide mitigates global climate change, and thereby reduces the spread and redistribution of disease that can be a consequence of global climate change.

Credit Goals

- Obtain 40% of annual volume of furniture and medical furnishings, based on cost, which complies with the Credit Goals of Construction: MR Credit 9.1-9.3 Furniture and Medical Furnishings.

Documentation

- q Prepare a matrix indicating the three Credit Goals and a listing of furniture, indicating that the requisite amount of furniture complies with the Credit Goals of MR Credits 9.1-9.3.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Refer to Construction: MR Credits 9.1-9.3.

2 points

EP Credit 6**IAQ Compliant Products****Intent**

Enhance building indoor air quality (IAQ) through procurement and implementation of low-emitting products and processes.

Health Issues

Volatile organic compound emissions (VOCs) from adhesives and sealants, paints, and carpet backing contribute to lowering indoor and outdoor air quality and negatively affecting human health. These VOCs and the carcinogens and reproductive toxicants addressed by this credit represent a serious health risk to both the installers and the building occupants. The at-risk populations in a health care system with impaired immune, respiratory, and neurological systems are particularly vulnerable to poor indoor environmental conditions, as are children, pregnant women, the elderly, and those with allergies, asthma or chemical sensitivities.

Formaldehyde (HCHO) emissions from casework and other engineered wood and agrifiber products contribute to diminished indoor and outdoor air quality, negatively affecting human health. Formaldehyde is listed by the U.S. EPA as a probable human carcinogen, and by the National Institute for Occupational Safety as a workplace carcinogen.

Credit Goals

Optimize use of air quality compliant materials inside the building to improve the building's emission profile. Points are awarded for the existence of sustainable product purchasing policies for the building and site addressing these requirements, and documentation of purchasing during the performance period in conformance with those policies, as described below. Subsequent re-certification is tied to both policies and purchasing performance, as described below. At a minimum, these policies must include the following product groups: paints and coatings, adhesives, sealants, carpet, composite panels, agrifiber products and building materials used inside the building. The building materials covered include any building materials used for improvements, including upgrades, retrofits, renovations or modifications, inside the building.

Calculate the percentage of the total sustainable material and product purchases (on a cost basis that meet the following IAQ compliance criteria:

- Adhesives and sealants with a VOC content that complies with Construction: EQ Credit 4.1 Credit Goals.

OR

- Paints and coatings with VOC emissions that do not exceed the VOC and chemical component limits of Green Seal's Standard GS-11 requirements and complies with Construction: EQ Credit 4.2 Credit Goals.

OR

- Carpet that meets the Credit Goals of Construction: EQ Credit 4.3.

OR

EP Credit 5 continued

IAQ Compliant Products

- Composite panels, agrifiber products and insulation that contain no added urea-formaldehyde resins and comply with Credit Goals of Construction: EQ Credit 4.4.

Credit 6.1	Purchase IAQ compliant for 45% of annual purchases (1 point)
Credit 6.2	Purchase IAQ compliant for 90% (1 point in addition to 6.1)

Documentation

- q Provide a copy of the organizational policy that specifies use of sustainability criteria for purchases of covered materials for use in the building.
- q Provide documentation of all covered materials purchased and total cost of these purchases over the performance period.
- q Provide documentation of all covered materials purchases that meet one or more of the specified sustainability criteria and the cost of these purchases over the performance period.
- q Provide a calculation of the fraction of covered materials purchased that meet one or more of the specified sustainability criteria (on a cost basis).

Reference Standards

Refer to Reference Standards in applicable Construction credits.

Potential Technologies & Strategies

When purchasing materials, supplies or equipment, specify that these must meet one or more of the specified sustainability criteria.

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Innovation in Operations

4 points

IN Credit 1

Innovation in Operations

Intent

To provide project teams and projects the opportunity to achieve points for exceptional performance above requirements set by the *Green Guide for Health Care: Operations* and/or for innovation for Green operations goals and strategies not specifically addressed by the *Green Guide for Health Care*.

Health Issues

The health care industry's environmental footprint is continuously evolving, as are responses to environmental stewardship and responsibility. The health care industry is uniquely positioned to evolve ever more powerful and innovative strategies to enhance building performance. These credits are intended to reward exemplary performance of existing credits and encourage implementation of innovative operations programs and ideas.

Credit Goals

Credit 1.1 (1 point)	Identify the intent of the proposed innovation credit, the proposed credit goals , proposed documentation to demonstrate achievement, and the operational approach used to meet the goals.
Credit 1.2 (1 point)	Same as Credit 1.1.
Credit 1.3 (1 point)	Same as Credit 1.1.
Credit 1.4 (1 point)	Same as Credit 1.1.

Documentation

- q Prepare the proposal(s) (including intent, requirement, documentation and operations approach) and relevant evidence of performance achieved.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Substantially exceed a *Green Guide* credit threshold such as for energy performance or waste management. Apply strategies or measures that are not covered by the *Green Guide* such as programs that return to procurement of reusable materials, special environmental educational programs (for example, "Garbage free lunch"), or community environmental programs (such as mercury thermometer exchanges).

1 point

IN Credit 2**Documenting Sustainable Operations Business Case Impacts****Intent**

Document sustainable building cost impacts.

Health Issues

Building a business case for sustainable design includes recognition of impact on operations. Impacts may be quantified in terms of monetary savings or avoided pollution. Making the business case reinforces the economic viability of adoption and implementation of sustainable operations policies and programs.

Credit Goals

- Document overall building operating costs for the previous five years (or length of building occupancy, if shorter), and track changes in overall building operating costs over the performance period. Document building operating cost and financial impacts of all of the aspects of *Green Guide* implementation on an ongoing basis.

Documentation

- q Compile all building operating costs for the previous five years (or length of building occupancy, if shorter).
- q Track changes in overall building operating costs over the performance period relative to sustainable performance improvement initiatives implemented and maintained for the building and the site.
- q Track building operating cost and the financial impacts in building operation covering all aspects of *Green Guide* implementation on an ongoing basis.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Track building operating costs to identify positive impacts relative to sustainable performance improvements to building and operations.

1 point

IN Credit 3.1**Documenting Productivity Impacts: Absenteeism & Health Care Cost Impacts****Intent**

Document absenteeism, health care cost and productivity impacts of sustainable building performance improvements.

Health Issues

There has been little data on productivity impacts related to sustainable buildings in health care. Studies on commercial office buildings have shown that workers in environments with improved indoor air quality, occupant control of ventilation and lighting, and access to nature have a reduction in illness/ absenteeism and increased productivity.

Credit Goals

- Document the history of absenteeism and health care costs for building occupants for the previous five years (or length of building occupancy with a minimum of 12 months) and track changes in absenteeism and health care costs (claim costs and any reductions in premium costs should be provided if available) for building occupants over the performance period relative to sustainable building performance improvements.

Documentation

- q Document the history of absenteeism and health care costs for building occupants for the previous five years (or length of building occupancy with a minimum of 12 months).
- q Track changes in absenteeism and health care costs (claim costs and any reductions in premium costs should be provided if available) for building occupants over the performance period relative to sustainable building performance improvements.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Track absenteeism and health care costs for building occupants to identify positive impacts relative to sustainable performance improvements to building IEQ and operations.

1 point

IN Credit 3.2**Documenting Productivity Impacts: Other Productivity Impacts****Intent**

Document other productivity impacts of sustainable building performance improvements.

Health Issues

There has been little data on Productivity Impacts related to sustainable buildings in health care. Studies on commercial office buildings have shown that workers in environments with improved indoor air quality, occupant control of ventilation and lighting, and access to nature have a reduction in illness/ absenteeism, and increased productivity.

Credit Goals

- Document other productivity impacts (beyond health impacts outlined in IO Credit 3.1) of sustainable building performance improvements for building occupants. Address and track changes in staff recruitment, satisfaction or retention, clinical performance measures (medical errors, for example) for building occupants over the performance period relative to sustainable building performance improvements, for a minimum of 12 months.

Documentation

- q** Document other productivity impacts for building occupants (beyond those identified in IO Credit 3.1) of sustainable building performance improvements. The documentation needs to address the impact on staff recruitment, satisfaction, retention or designated clinical performance measures for building occupants relative to sustainable building performance improvements, for a minimum of 12 months.

Reference Standards

There is no reference standard for this credit.

Potential Technologies & Strategies

Set up a system to track changes in the impacts in productivity by building occupants over the performance period relative to sustainable building performance improvements (beyond those identified in IN 3.1).